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CAMELLIAS

KINDS AND CULTURE

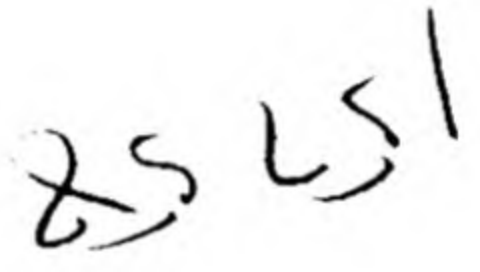
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CAMELLIA SASANQUA

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CAMELLIAS

KINDS AND CULTURE

by

H. HAROLD HUME



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1951

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PREFACE

"Camellias—Kinds and Culture" is a companion volume to "Azaleas—Kinds and Culture," the two covering in ampler measure the field dealt with in "Azaleas and Camellias," the small book published in 1931. The years elapsed since that date have seen large increase in knowledge of all things pertaining to camellias, and a deeper, widely extended interest in their culture has developed.

Much attention has been given to their propagation. Not so long ago they were regarded as difficult subjects, but the problems of propagation for the most part have been solved and camellias are now increased readily and in large numbers. This has come about, not through the development of new techniques but by careful attention to the details of old ones already used widely in the propagation of many other kinds of woody plants.

Culture of camellias has been extended into new areas in some cases far outside localities where they were planted in the earlier years of their popularity. Much has been learned regarding the winter resistance of species and varieties, and there are indications that their culture may be further extended into areas where they are not grown now.

In some areas large numbers of plants are grown in containers, a method of growing for which they are especially adapted. This is a specialized and important section of their culture. In greenhouses also they are receiving a large share of attention, and camellia flowers are becoming an important item in the florist trade.

In old gardens camellias were used almost entirely as individual plants. There is, of course, no question that a single well-grown specimen may be the outstanding feature of a garden, but this is not the only use to which they are adapted. Now they are coming into use for hedges, screens, borders and for many purposes for which they were not formerly planted. This has come about from a realization of their great value as fine landscape material and an appreciation of their unusual beauty.

Older plantings were made almost entirely with Japonica varieties. Their outstanding values were realized many years ago but specimens belonging to other species are now coming into use. Already Sasanquas are finding their rightful place as fine garden plants. One variety of the Reticulata group has been planted here and there in a limited way, but the addition of other sorts recently acquired will further extend plantings of varieties belonging to this species. In addition, new species, notably *C. cuspidata* and *C. saluenensis*, have been introduced and are now being planted in gardens. It is to be expected that in the not too distant future, gardens will be enriched through the additions of varieties in many forms and colors now unknown.

Securing new seedling varieties of known parentage is receiving a large share of attention. Already numerous crosses have been made and interspecific hybrids have been secured, some of which are very lovely. Others are on the way. Possibilities in this direction are unlimited. The introduction of new camellia species and varieties has opened up large opportunities for securing distinct and unusual additions to camellia lists.

Illustrations are an important part of this book. The drawings with one exception are by Esther Coogle of the University of Florida, the photographs are by P. Mark Parthemore of the J. Horace McFarland Company and the fine illustration of *Camellia saluenensis* is by Stella Ross-Craig of the Royal Botanic Gardens, Kew, England. Their assistance is appreciated greatly and sincere thanks are extended.

All of this is bringing and will bring an extension of camellia plantings, and in consequence problems related to every phase of their culture are bound to arise. This volume is presented in the hope that it will assist in growing better camellias in larger numbers, under all conditions and for all uses to which they are adapted.

H. Harold Hume

Gainesville, Florida
January, 1951

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1

CAMELLIA GEOGRAPHY

15954

TRACING back to the origins of many plants that now grace the gardens of different parts of the world, one finds that large numbers of them started in eastern Asia. A few are unmodified transplants from the wild, while others have been secured by breeding and selection, using parents that belong as native plants to that great region. From that source have come roses, peonies, daylilies, azaleas, rhododendrons, hollies and magnolias, to mention only a few.

From the same areas camellias, too, have come. Regardless of where they are growing now in gardens, patios or greenhouses, the lineage of all of them, of whatever variety or species, traces back to the Orient. In that region the different camellia species—and they are considerable in number—grow or have grown as native plants on the mainland of eastern Asia from Indo-China to Korea and on the islands that lie off shore. Species are native in the island of Formosa, and in the Japanese Islands some are found growing as wild plants from the southern parts as far north as 38° north latitude. In recent years quite a few new species have been described, and undoubtedly there are more to be discovered. Plant explorations, up to this date, indicate that there are camellia species in appreciable numbers native in Indo-China and in the Chinese provinces of Yunnan and Kwangtung particularly. More species are credited to Yunnan than to any other Chinese province, and both Yunnan and Kwangtung are doubtless good hunting ground for additional new species or forms.

Camellias native in eastern Asia

Sometimes it is difficult to decide exactly where

plants growing in China or Japan are native. From time to time botanists have assigned certain plants to one of these countries only to find later, on unmistakable evidence, that they really belong to the other as native or endemic plants. This has been true of quite a number of species. In several instances, species are found only in gardens, and their wild forms may still be discovered growing in the far reaches of the Orient. That is what happened with *Camellia reticulata*. It was first located in a nursery garden in a coastal town, and not until about a century later was its wild form discovered far inland.

Interchanges between China and Japan

Over a period of several centuries plants have been exchanged between China and Japan, particularly through the agency of Buddhist monks, and it may be that camellias regarded as native in both areas are really feral in only one of them. Finding conditions in a new environment suited to their growth and the development of seed, plants are likely to escape from cultivation and grow and behave like natives. For many years *Camellia Sasanqua* has been regarded as native only in Japan. But the original herbarium specimen from which Leonard Plukenet made the illustration, fig. 2, plate 409, published in his "Amaltheum Botanicum" in 1705, now in the Sloane Herbarium at the British Museum (Natural History), was collected by James Cunningham on the island of Chusan close to the China coast. It is *C. Sasanqua*. This casts some doubt on the belief that *C. Sasanqua* is endemic only in Japan.

Cunningham collected *C. Sasanqua*

In certain definite ways, plants are creatures of their environment. Through ages they have grown under more or less fixed conditions of climate and soil. Salient climatic features of those areas in which the more important garden camellia species are en-

Plants and environment

demic are light, rainfall, uniformly cool temperatures and much cloudiness in winter, and heavy rainfall, high temperatures at times and high humidity in summer. Soils are acid. These conditions must be approximated or duplicated wherever they are grown.

When plants are moved out of the surroundings in which they are native into new ones, they are not likely to succeed unless their new environment duplicates the old, and it must be remembered that all cultivated plants were wildlings somewhere, or their ancestors were. In areas where conditions are not suitable, it is sometimes possible to make an environment to fit the needs of introduced plants, but some features are difficult to adjust or duplicate. There is little control over temperatures, rainfall, humidity, light and wind movement in wide-open spaces, and none over the relative lengths of night and day. Hence, to a large extent for garden uses, camellias must be fitted into climatic conditions suited to their needs.

Because of similarities in environment between eastern Asia and parts of North America, camellias are grown successfully in large parts of the latter continent. The age, condition and behavior of many specimens in southeastern, southern and western parts of the United States bear testimony to their having found a congenial home. They are now growing in gardens from southeastern Virginia southward in fairly close proximity to the Atlantic Ocean into Florida, westward around the Gulf of Mexico into Texas and on the Pacific Coast from California northward into British Columbia. This, of course, is a very broad statement, for they are not and cannot be grown in all parts of this great area. Local conditions of exposure, elevation, proximity to the oceans, rainfall and humidity have to be considered and evaluated.

Camellia environment in America



CAMELLIA CUSPIDATA
Flowering twigs above
Left: Open flower, Cornish Snow, a hybrid
Right: Flower bud, Cornish Snow

These factors of environment must be measured in relation to the growth and welfare of the plants. Difficulties of culture are increased by low temperatures in winter, low humidity, poor drainage and alkaline soils. However, in large parts of what may be called the American camellia area, conditions are congenial and the plants behave like natives. Neither in growth behavior nor in general appearance are they materially different from native broad-leaved evergreens of many kinds. In gardens and greenhouses of many parts of the world camellias have found their place and are prized for their beauty. At this time the United States of America leads in number of plants and in their extensive use in ornamental plantings.

Distribution in cultivation

There are tropical camellias, but garden camellias of today are not tropical plants. Instead, the species from which garden varieties are derived belong to the warm temperate zone. During the summer months they are not affected adversely by high temperatures provided moisture is sufficient in the soil under cultural conditions, and humidity is maintained at high levels. Some varieties, particularly those blooming late in the season, are not adapted to areas of high winter temperatures of long duration, and no camellias will grow and bloom satisfactorily in locations where the thermometer drops too low. In areas where the winters are very cold, flowers and buds may be damaged even though the plants escape injury, for plants will withstand much colder weather than flowers and buds. Cool weather in winter is necessary for best growth of all those horticultural species and varieties now commonly grown in gardens in the United States. An ideal location for growing Japonicas, from the standpoint of winter climate, would be one in which temperatures would not drop below 25° or 30° nor rise above 60° F. Following

Garden camellias of today not tropical

unusually warm winters, such as occasionally occur in some southerly areas where camellias are grown, many varieties of *C. japonica* do not make normal growth in spring. Shoots are stunted, leaves fail to develop, flower buds are formed in clusters, and it may even be that new growth does not start until very late, if at all.

Optimum winter temperatures

In summer it does not matter if the thermometer registers 100° F. or so at times, if moisture in soil and air is present in sufficient amounts. High temperatures from time to time during the day actually may be helpful in developing good flower and shoot buds. There is nothing in the behavior of *C. japonica* varieties, in areas where such heat is a usual part of climatic conditions, to indicate otherwise or that such summer temperatures are harmful in any way.

Summer temperatures

Southward, that is toward the tropics, the area adapted to camellia culture is limited by high temperatures (particularly in winter) unless the elevation is high enough to provide a climate suited to their requirements, while northward the area is restricted by low temperatures in winter. Hence it may be stated that winter temperatures, both high and low, are definitely limiting factors in the cultural distribution of the more important species, *C. japonica* and *C. Sasanqua*, commonly grown in gardens.

Winter temperatures a limiting factor

Observations on the behavior of specimens belonging to these two species planted in northern sections of the camellia area indicate that varieties belonging to *C. Sasanqua* definitely are hardier than Japonica varieties. *C. reticulata* is less winter resistant than either of them. Among Sasanqua varieties there probably are some that are hardier than others, but information covering this point is lacking. However, those who contemplate trying camellias in colder sections are well advised to try varieties of this group. Since forms belonging to the

latter species bloom early, September into December in many areas, their flowers usually escape frost damage in colder regions.

In considering temperatures in relation to camellias, it should not be overlooked that the plants themselves must be taken into account. Temperatures cannot be discussed and determined in an abstract way. In the final analysis, the only way to determine whether these plants are suitable for a given location is to try them out in that place. Oftentimes it may be found that some varieties are adapted while others are not.

Camellias are grown under glass far outside the limits of their culture in gardens. Factors affecting their growth, such as soil, water, humidity, temperature and light, are brought under control in greenhouses and these particular conditions are adjusted to their needs. Since they are so well adapted to pot culture, they need not be set in the ground and in locations where soil is not suitable for their culture; but where other conditions either are satisfactory or can be made so, they can be grown successfully outdoors in containers. It is not too much to say that in adaptability to pot culture, they are surpassed by no other woody plants. Hence the limits of their culture can be extended far beyond their normal geographical range by growing them in pots in gardens or in greenhouses.

Extension of culture in greenhouses



CAMELLIA HONGKONGENSIS

(After Herklots)

2

CAMELLIA HISTORY

HUNDREDS, perchance thousands, of years before they became known to botanists and gardeners of the western world, camellias of some species were taken from habitats in which they were native and were cultivated in gardens and nurseries of the Orient. Different kinds of ornamental plants, camellias among them, were exchanged in later years between China and Japan by Buddhist missionaries, who planted them about their temples. These plants also found their way into privately owned gardens of both countries. To such an extent did this interchange of plants between the two countries take place that it is sometimes difficult to determine exactly where they were indigenous. They were grown and cared for because they possessed certain values, economic and æsthetic, and in consequence were regarded as important.

Camellias and Buddhist missionaries

Since economic values in early civilizations were the more urgent, it is safe to assume that the culture of certain kinds of camellias first was undertaken because an oil useful for many domestic purposes could be extracted from their seeds. In China, the species now known as *Camellia oleifera* was and is grown for its oil-bearing seed, while in Japan *C. Sasanqua* replaced it as a source of seeds for oil. From seeds of other species, including *C. sinensis* (the tea plant), oil also was obtained. In China from ancient times and in Japan from a somewhat later date, *Camellia sinensis* has been grown for its leaves used in making tea. It would be difficult to secure specimens of *C. oleifera* and *C. sinensis* at this time that are really wild, and the same is probably true of some other species.

Economic importance of camellias

Plants for the early culture of camellias were raised from seed, and when they came into bloom some specimens bore flowers of unusual form and attractiveness. These perhaps were worthless as sources of oil but they were appreciated for their beauty, and because of their æsthetic values they were grown in pots and in gardens. Since, for the most part, they bore no seeds from which they could be propagated, and even if they had they would not have reproduced true to flower type, it became necessary to resort to cuttings and grafts to increase their numbers. They were propagated and grown as potted plants in the nursery gardens of the seaport towns of China and Japan where Europeans first found them. They had become articles of trade, and so in this way their economic and æsthetic values were combined.

Trade in camellias

Far-reaching changes and developments followed the discovery of America by Columbus in 1492. Prior to that date, the voyages of European sailors, handicapped as they were by ignorance, superstitions and the belief that, in their small vessels, they could not surmount the real or imaginary dangers of the distant seas, were confined to near-by waters. Now Columbus had made them free, and the spirit of adventure within a few years took them in their ships to the far corners of the earth. The Portuguese reached China in 1516, and in 1542 they were in Japan. The Dutch arrived in the East Indies in 1596 and made contact with Japan in 1600 and opened trade. During this same period the English also were active in oriental waters, and in 1611 they, too, initiated trade with Japan.

Europeans reach the Far East

Lucrative trade in spices, silks, porcelain, paintings and the treasures of the East developed. Oftentimes a voyage brought a profit of a hundred percent or more on its cost. Rivalry between the merchants of different

countries became keen and ruthless, and the difficulties of trading increased. To offset these, to make profits more certain and trade more dependable, companies were formed in different countries—Holland, Spain, Italy, Sweden and others—for the special purpose of carrying on commercial relations with the Orient. One of these, in many ways the most important of them all, usually known as the British East India Company or legally as "The Governor and Company of Merchants of London Trading in the East Indies," was chartered for fifteen years by Queen Elizabeth, on the last day of the year 1600. Before the expiration of the authority she granted, the charter was extended in perpetuity by King James, who followed Elizabeth on the throne of England. To officers, merchants and seamen connected with this company must go credit for the introduction of many east Asian plants to English gardens.

East India Companies

In 1676 an English factory was opened at Amoy, China, and in 1684 another one at Canton. These factories were trading posts, and to them men went out from the home country to establish relations with the native peoples, to secure cargoes for vessels and to prepare and pack materials for shipment. Doctors, oftentimes as much botanists as physicians because many of the medicines used in treating human ailments were obtained from plants, were located at the factories to look after the health of the staff.

James Cunningham (also spelled Cunninghame), a Scotch physician in the employ of the English East India Company, went out to Amoy (Emoui), China, in 1698. He returned to England the next year, but October 1, 1700*, again found him in China on the island of Chusan, where he remained for two years.

James Cunningham

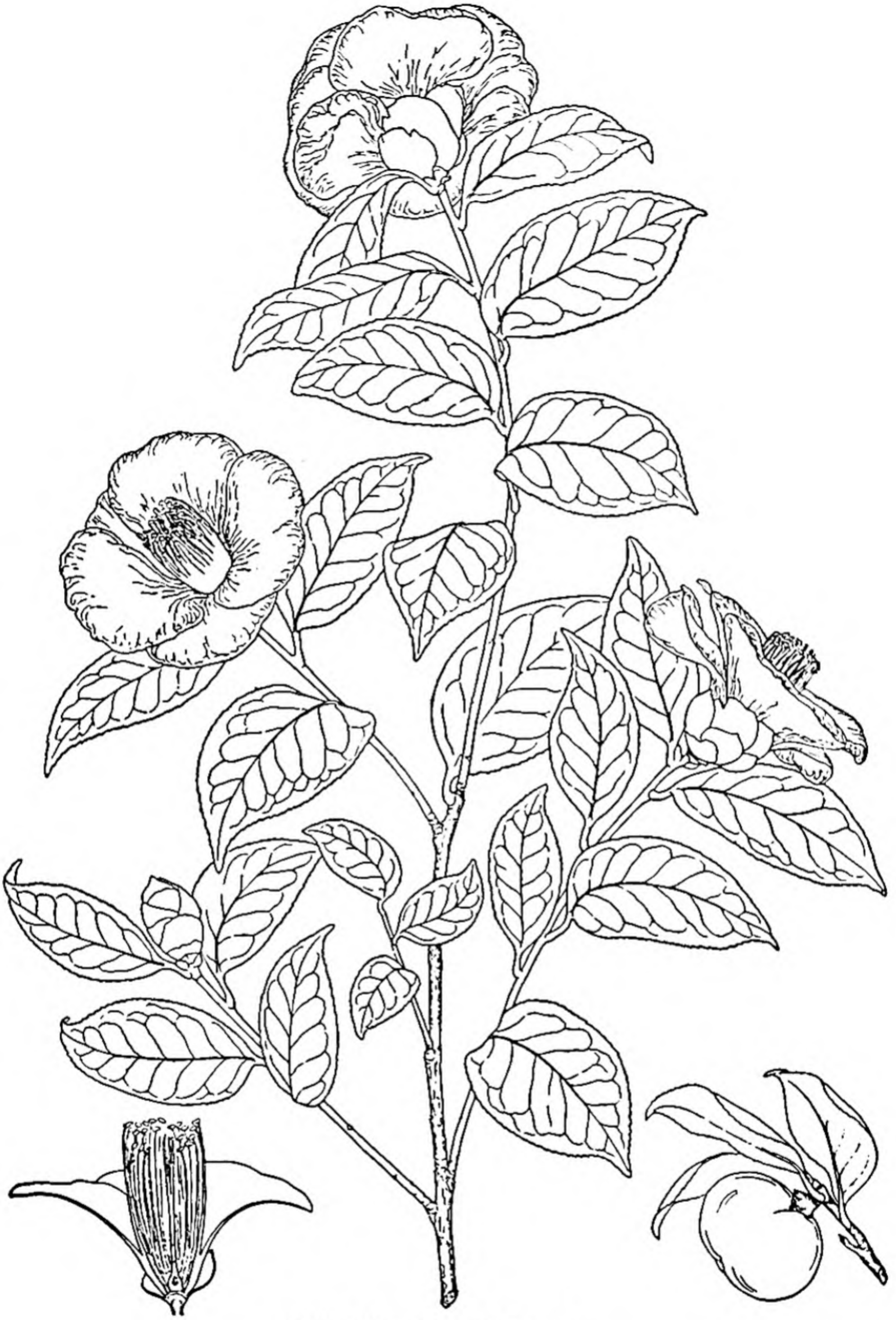
*By some writers this date is given as 1701.

He collected plants and parts of plants and made herbarium specimens, among them material of what is now known as *Camellia japonica*. Some of these specimens came into the hands of James Petiver, an apothecary whose place of business was on Aldersgate Street, London. He was a man of importance, for he was a member of the Royal Society, interested in the Physic Garden of the Apothecaries at Chelsea, was an associate of John Ray, the English botanist, and of Sir Hans Sloane, noted English physician, botanist and patron of botany of that time.

Cunningham also had a series of colored drawings made of Chinese plants and plant parts, flowers, fruit, leaves and branches. These, to the number of 1464, are now in the British Museum (Bloomsbury), London (Sloane Mss., 5292, 5293, 5294). They were done at Emuy (Amoy) by Dr. Bun-Ko, a Chinese artist, taken to England by Charles Brewster and delivered to James Petiver in 1701. These drawings, together with herbarium specimens that Cunningham collected, made possible an early understanding of some Chinese plants. Petiver made use of these materials in his writings and at the same time gave credit to the man who had helped him so greatly.

James Petiver

Petiver was interested in and maintained a museum, which was a general collection of natural history objects—plant, animal and mineral. It must have been an important museum, for Sloane at one time offered £4000 for it, a large sum of money for that time, which apparently Petiver did not accept. But after Petiver died in 1718, Sloane acquired the museum, and it became part of the foundation materials with which the British Museum (Natural History) was established through Sloane's bequest to Britain. Petiver published an interesting sheet called the "Gazophyllacii Naturæ



CAMELLIA JAPONICA
Fruit and section through flower

& Artis" made up of brief descriptions and illustrations of the things he procured for his museum. In one of these pamphlets, in 1702, he published an illustration of a plant which, although somewhat inaccurate, represents a camellia drawn from the specimens collected by James Cunningham on the island of Chusan. A twig, leaves, buds and flowers are shown in Tab. XXXIII-4. In the same year, 1702, he described its leaves, flower buds, flower and fruit in a paper presented at a meeting of the Royal Society, which was published in the Philosophical Transactions in 1704. Critical examination of the four Cunningham specimens now in the Sloane Herbarium at the British Museum (Natural History) from which Petiver made his composite engraving, leaves no question that what Petiver illustrated and described was *Camellia japonica;* and so this species, represented by dried specimens, was introduced to English botanists and plantsmen.

Leonard Plukenet, who was a contemporary and rival of James Petiver, gave brief notes on a camellia accompanied by an illustration of a twig with leaves and a single fruit in his botanical work "Amaltheum Botanicum," 1705. He did not indicate that it was different from *C. japonica* illustrated and described by Petiver in 1702. The specimen from which Plukenet made his drawing also is in the Sloane Herbarium at the British Museum (Natural History). It was collected by James Cunningham on the island of Chusan at or about the time he collected the specimens of *C. japonica* from which Petiver made his illustration. A careful examination of what may be called the Plukenet specimen shows that it is *C. Sasanqua*. Hence, to Cunningham, certainly the first extensive collector of herbarium specimens of Chinese plants, must go the credit for having found *C. Sasanqua* as well as *C. japonica*

Plukenet's specimen

growing on Chusan in the beginning of the eighteenth century. These collections probably were made during the autumn of 1701, for he arrived in Chusan on October 1 of that year, though the specimens of *C. japonica* may have been collected somewhat later in the winter of 1701–02.

In 1712, Englebert Kæmpfer, a physician in the employ of the Dutch East India Company, who had been stationed (1690–92) at the company's factory in Japan, published his "Amœnitatum Exoticarum," a volume dealing with the many things he had seen in the Far East. This work is divided into five parts (fasciculi). The Thirteenth Observation of Part III is given to a discussion of the tea plant, *C. sinensis*—its botany, culture and the preparation of its leaves for making tea. His discussion was accompanied by a fine plate showing twigs with leaves, flowers and fruits. In the fifth part, pages 850–853, under the Japanese name for camellia, which he spelled in three different ways—Tsubacki, Tsubaki and Tsubakki—indicating something of his difficulty with phonetic spelling, he described varieties of both *C. japonica* and *C. Sasanqua*, as they later were named, and listed the names of twenty-three horticultural varieties. He also referred to garden forms with simple and double flowers. This was a very important contribution to camellia literature, as will be seen later.

Kæmpfer's relation to camellias

Kæmpfer was a skillful artist and accompanied his discussion of Tsubaki with an illustration so excellent that no doubt is left as to its identity. The details presented leave little to be desired. Kæmpfer left a few camellia herbarium specimens secured during his stay in Japan. These are in the Sloane Herbarium, British Museum (Natural History), having been secured by Sir Hans Sloane after Kæmpfer's death in 1716.

Carolus Linnæus, who was born May 23, 1707, at Rashult, Sweden, became the world's most famous botanist and gave camellias their Latin name. His great contribution to botany was the establishment of the binomial system whereby plants are named with two Latin words. He also worked out a system of botanical classification. In connection with his studies he named many plants described by others but which he had never seen, among them Kæmpfer's Tsubaki. In his "Systema Naturæ," 1735, he bestowed the generic name *Camellia* on these plants in honor of George Joseph Kamel, a Moravian of the Jesuit order, who was born at Brunn, Moravia, April 21, 1661. Kamel (in Latin, Camellus) had gone as a missionary to the Ladrones in the Pacific in 1688. Later he went to Manila, where he died May 2, 1706. He wrote a paper on Philippine plants that John Ray added as an appendix of ninety-six pages to the third volume of his "Historia Plantarum" published in 1704, but *C. japonica* and *C. Sasanqua* were not among those he described because they are not plants of the Manila area, either wild or cultivated.

Linnæus and Kamel

Here and there in camellia literature, statements are found that Kamel brought the camellia to Europe and that through him, Linnæus became acquainted with the plant. There is no evidence that Kamel ever returned to Europe after he went out to the Pacific or that he ever saw plants of *C. japonica*. They were not grown in Manila, where the climate is tropical, and so far as known he never visited China or Japan, where they are native. It was, of course, impossible for him to have contacted Linnæus, since he died the year before Linnæus was born. When Linnæus gave the camellia its Latin generic name he did so in honor of Kamel (Camellus) because he had contributed to



CAMELLIA MALIFLORA

Linnæus named camellia for Kamel

the knowledge of plants of the Far East. Moreover, it is quite certain that when he named them, Linnæus knew camellias only from what others, notably Kæmpfer, had written about them. He gave Kæmpfer as the source of his information. Two years after giving camellias their Latin name, Linnæus in his "Hortus Cliffortianus," 1737, indicated that he had named the genus *Camellia* for Kamel. Linnæus's interest in camellias continued. In his "Species Plantarum," 1753, he gave "Japonicas" their complete Latin name, *Camellia japonica*, and also established a binomial for the tea plant, *Thea sinensis*, later changed to *Camellia sinensis* by O. Kuntze. Linnæus, with others, was interested in bringing the tea plant to Europe and in growing it for the production of tea. These attempts at introducing it resulted in securing camellia plants instead, which had been substituted for the true tea plant, and it was not until a much later date that tea plants were established in Europe.

"A Natural History of Birds" by George E. Edwards was published in London in 1747. One of its illustrations, dated 1745, shows a Chinese bird sitting on a flowering camellia branch. In an accompanying note, Edwards stated that he had drawn the flower from nature and that it had been raised by Lord Petre, Thorndon Hall, Essex. In English writings, the date of the introduction of the camellia to England is given as "before 1739," but how or by whom is not known.

Edwards camellia illustration

If the illustration by Edwards is at all accurate, and there is no reason to believe otherwise, then Lord Petre's camellia shown in "A Natural History of Birds" started to grow a good many years before 1745, the date shown on the plate. There can be little doubt that it came to England in a sailing vessel of the British East India Company. Lord Petre was a plant collector

and a grower of note, who had brought together a large collection of exotics. Camellias grown by him were the first living specimens in England so far as records show.

At Caserta, Italy, according to L'Abbé Berlèse, a single-flowered camellia was planted in a royal garden in 1760. Berlèse wrote about it in 1837; he said it flowered profusely and produced seed abundantly. Italy became the source of a large number of camellia varieties, many of which were described by Berlèse and others, later by Tirocco, both of whom were Italians.

An early camellia in Italy

The March, 1788, number of the "Curtis Botanical Magazine" contains a colored illustration of a red, single-flowered "Japonica" accompanied by a brief note, but whether the plant from which the flower was secured was connected in any way with Lord Petre's introduction is not known.

Early camellia introduction to England

With the introduction in 1792 of Alba Plena and Variegata, both good varieties, by Captain Connor of the British East India Company's vessel *Carnatic*, the culture of camellias received a real impetus. With these camellia culture really started. Before that date camellias had received scant attention, for flowers produced by earlier introductions were small and not particularly attractive. Captain Connor's varieties were followed by others—Rubra Plena 1794, Incarnata (Lady Humes Blush) 1806, Carnea 1808, Variabilis 1816, Fimbriata 1816, and the Pæonifloras in 1810 and 1820. Additional varieties were brought in later.

Samuel Curtis in his "Monograph on the Genus Camellia," 1819, furnished illustrations of eleven varieties by Clara Maria Pope; all of these were introductions from the Orient.

The next important publication, 1825, was the Chandler Nursery catalogue in which seedling varieties raised by Alfred Chandler at Vauxhall, England,

Early English literature

were illustrated and described. The catalogue, entitled "Camellia Britannica," was prepared jointly by Alfred Chandler and Edward B. Buckingham.

William Beattie Booth in "Transactions of the Horticultural Society of London," 1830, listed twenty-three varieties of "Japonicas" that had been brought to England in the period 1792–1830 from the Orient, probably all from China.

Early camellia seedlings

In the 1820's varieties produced from seed began to appear. John Alnutt exhibited a seedling variety in 1823 and William Ross another in 1824 at exhibitions of the London Horticultural Society. In the "Camellia Britannica," 1925, Alfred Chandler listed new varieties of his own raising. Growers on the Continent and also in America undertook the production of meritorious varieties from seed, and from 1830 the number of new sorts, some of which doubtless were quite inferior, increased rapidly.

Publication by Baumann Brothers

Baumann Brothers, nurserymen at Bollwiller, Haut-Rhin, France, published a series of plates, twelve in 1829, thirteen in 1831, twelve in 1832, and twelve in 1835, a total of forty-nine. The text accompanying these plates was partly in French, partly in German.

L'Abbé Berlèse

L'Abbé Berlèse, abbot of the monastery of Sainte-Rose in Italy, went to Paris as chaplain of the court, became interested in camellias, brought together a large collection, and was instrumental in greatly advancing their culture. He became the foremost authority of his time on the group. From his pen came "Monographie du Genre Camellia," 1837, followed by a second edition in 1840, and a third in 1845. This monograph was translated into English and German in 1838. The first volume of "Iconographie du Genre Camellia," a large three-volume work, appeared in 1841, the second and third volumes in 1843. These



CAMILLE PISSARRO — BESSE MEADOW

contain 300 camellia illustrations in color. Subsequently in 1849 he published 151 descriptions of camellia varieties in "Annales de la Société Centrale d'Horticulture de France." This, so far as known, was his last contribution to camellia literature. He disposed of his collection in Paris in 1846. Some time after that he returned to Italy, where he died at his monastery in 1863.

Verschaffelt's "Iconographie"

At Gand, Belgium, Alexandre Verschaffelt started a publication on camellias, "Nouvelle Iconographie des Camellias." On his death, the publication was continued by his son, Ambroise. A volume appeared each year from 1848 to 1860 inclusive, a total of thirteen. In this series, 623 camellias were illustrated.

Many smaller works on camellias and numerous articles in the horticultural press of the period were published, but the literature cited is the most important of what appeared in Europe prior to 1861. After that date, interest in camellias declined.

Camellias come to America

It is recorded that John Stevens, Hoboken, N. J., secured a single red camellia from England in 1797 or 1798. When Michael Floy came from Devonshire to New York in July, 1800, he brought a plant of Alba Plena for Stevens. There must have been some contact between the two before Floy left England. There is another early record of Alba Plena in the United States, for John Prince in Boston received a plant of that variety from Joseph Barrell of Charlestown, Mass., in 1806. Was Barrell's plant connected in any way with the one Floy brought over? Michael Floy established a nursery and florist business in Bowery Village and Harlem and throughout his lifetime was interested in camellias. He is credited with having grown from seed, the first of which he planted in 1809, forty-two seedlings that were listed and described briefly. Others



CAMELLIA OLEIFERA

in New York and its vicinity who grew camellias were Thomas Hogg, William Prince, Noel J. Becar, Thomas Dunlap, D. Boll and Grant Thorburn. These men had connections with camellia enthusiasts in other Atlantic Coast cities and with growers in England and other parts of Europe. It is known that Prince had a sales representative in Savannah at an early date.

Camellias received a large amount of attention from several amateur and professional growers in and near Boston. Among these, Marshall P. Wilder, C. M. Hovey, Samuel Sweetser and Col. Thomas H. Perkins were prominent. It is not too much to say that most of the European varieties available were brought to Boston between 1830 and 1860 by these men. Camellia shows were held by the Massachusetts Horticultural Society at which they were frequent exhibitors. Wilder was an outstanding amateur horticulturist interested in fruits and ornamental plants, camellias in particular. He raised many seedlings—at one time he had 600—in an effort to secure new varieties. Two varieties, Wilderi and Mrs. Abby Wilder, resulted from his efforts. A small stock of these two was sold to J. L. L. F. Warren, also of Boston, who took specimens to England for sale. Wilder had a collection of 300 named varieties, the larger part of which was imported from Europe. His collection went to the Boston Public Garden, where it was destroyed by fire in 1843.

Early camellias in Boston

C. M. Hovey, editor of "The Magazine of Horticulture" ("Hovey's Magazine"), seedsman and nurseryman of Boston, was interested in camellias and through his magazine, published from 1834 to 1868, did much to advance their culture. Varieties C. H. Hovey, C. M. Hovey and Mrs. Anne Marie Hovey were important camellias among those he originated. Two of these are still available in the nursery trade. Col. Perkins

and Samuel Sweetser, amateur growers, maintained large collections of American and European varieties.

If the number of varieties originated, exhibited and introduced, and the number of individuals, amateur and professional, and firms who grew camellias are an index of the plant's importance, then Philadelphia at one time was the camellia center of the United States. From its nursery greenhouses, plants went out to various northern points, into the South and to Europe. The list of growers includes the names of Robert Buist, Robert Carr, William Hamilton, David Landreth, Peter Mackenzie, Peter Raabe, James Ritchie, John Sherwood and James B. Smith. Doubtless there were many more. Robert Buist, a Scotchman who came to Philadelphia in 1828, was noteworthy for his writings and for the extent of his nursery and plant business. When he was about to retire in 1875 he advertised that among his stock of plants were 20,000 camellias. With Thomas Hibbert he was joint author of "The American Flower Garden Directory," and after Hibbert died in 1838 he continued it through several editions. William Hamilton, interested in plants of many kinds as a hobby, was one of the earliest to grow camellias. David Landreth, who started the first seed house in the United States in 1784, was an important camellia grower at an early date. He introduced the variety Landrethi in 1832. On King Street, Charleston, S. C., a Landreth's seed store was opened in 1818. It was managed for several years by David Landreth, Jr., and continued in business until 1862, when it was taken over by a Confederate court. Through this connection there is no question that many camellias came into the Charleston area and other parts of the South. John Sherwood was a large grower. In the season 1847–48 he had 20,000 camellia plants in his

Philadelphia growers

greenhouses. James B. Smith is noteworthy for the large number of seedling camellias he grew and the number of valuable varieties he secured. The Pennsylvania Horticultural Society, founded in 1827, held camellia shows and in other ways advanced the culture of camellias. At Baltimore both Samuel and John Feast and Edward Kurtz introduced new camellias between 1840 and 1850, and in 1880 Robert J. Halliday published his "Practical Camellia Culture," the first American work on camellias.

Camellias come to the South

From northern growers and to a less extent through importations from Europe, camellias came into the South. Noteworthy collections were planted at Magnolia Gardens and at Middleton Place Gardens on the Ashley River inland from Charleston, S. C. Numbers were also planted at Savannah and elsewhere in Georgia. One of the earliest plantings of camellias in Louisiana is at Rosedown near St. Francisville, dating back more than a century. In later years, beginning in 1857, P. J. Berckmans of Fruitland Nurseries and his sons were instrumental in introducing camellias from northern sources and from Europe, while in Mobile D. W. Langdon imported and grew camellias in 1853 that were planted in the Gulf Coast country.

Early camellias in California

From Boston, James L. L. F. Warren, who some time before had purchased the two Wilder camellias, Wilderi and Mrs. Abby Wilder, moved to California and established a mercantile business at No. 15, J Street, Sacramento. His interest in camellias continued, and he decided to try them in California. On February 3, 1852, he received a shipment of seeds and plants from the East, among them some camellia plants. They had come by ship to the Isthmus of Panama, overland to the Pacific, thence to San Francisco by the steamer *Panama* and finally to Sacramento by a river boat.

So far as known, these were the first camellias to reach the West. Interest in their culture in California continues to this day, and Sacramento has become a great camellia center. Plants were exhibited at the first California State Fair, held in San Francisco, October 6, 1854. In that city, too, on February 2, 1854, W. C. Walker advertised camellia plants for sale in an agricultural paper, "The California Farmer." Now they are grown in gardens of the West Coast, wherever conditions are suitable, all the way from California to British Columbia. Where conditions in some particulars are not satisfactory for open-ground culture, skill in growing them in containers has developed.

Interest in camellia culture and securing new varieties began to wane about 1860, and it finally came about that for a period of sixty years or so they received scant attention in either Europe or America. Now they are in greater favor than ever before.

3

CAMELLIA BOTANY

CAMELLIAS belong to the family Ternstrœmiaceæ, established by Robert Brown in 1818. Commonly it is known as the Tea Family. Some botanists use the family name Theaceæ for this group of plants, but Ternstrœmiaceæ is given preference here. Although trees and shrubs belonging to this family are widely distributed, the species of most importance in horticulture are native in eastern Asia and in the southeastern and southern parts of the United States in North America. One of these plants, *Stewartia ovata*, native in the American Appalachian Plateau, is sometimes called Mountain Camellia, but true camellias all trace back to their native home in eastern Asia, and none are endemic in North America, where the family is represented by plants belonging to the genera *Franklinia*, *Gordonia* and *Stewartia*. Representatives of the genera *Gordonia* and *Stewartia* are also found in eastern Asia. To this family belong two elegant trees, gordonia and franklinia, one evergreen, the other deciduous, the beautiful shrubs or small trees, camellia and stewartia, and two species of great economic importance—the oil-bearing camellia of China and the tea plant of the Orient, cultivated for many centuries.

Camellia relatives

Family Ternstrœmiaceæ. Evergreen or deciduous trees with alternate, simple, exstipulate leaves; flowers produced singly or in small clusters, axillary, regular, perfect; sepals 5 to 7, imbricated; petals 5 to 9 united with the stamens (adnate); stamens usually numerous, united to one another (connate); ovary superior, 2- to 10-celled; styles united or free; fruit indehiscent, dry or drupe-like or a dehiscent capsule; native in tropical and warm temperate regions.



CAMELLIA RETICULATA

Genus Camellia. Evergreen shrubs or trees; leaves leathery or coriaceous, lanceolate or elliptic to oblong-oval, acuminate or blunt pointed, dark green, mostly glossy, serrulate or crenulate; petioles short; flowers borne singly, in pairs or in clusters of 3 or more, white, red or variegated; calyx of 5 sepals, imbricate with 2 to 5 smaller imbricate or separated bracteoles that in most species completely hide the very short pedicel; stamens numerous, outer ones forming a cup or cylinder for some distance above their union with the petals or quite free to within 2 to 3 mm. of the point where the petals are adnate; ovary 3- to 5-celled; fruit a woody capsule, loculicidal; seeds subglobose or angular; native in eastern Asia from Indo-China to Korea and in the islands off the China coast. There are many cultivated forms, derived principally from two species, *Camellia japonica* and *C. Sasanqua*, that have been grown as ornamentals in China and Japan for centuries. They are planted now in gardens in many parts of the world where soil and climate are suited to their needs.

The genus *Camellia*

Species. It is difficult to say how many species of camellia there are. In the first place, the regions where they are native are far from having been explored thoroughly, and there can be no doubt that species now unknown will be discovered in the future. Furthermore, a critical study of plants now in cultivation in gardens and nurseries may bring to light differences that will lead botanists to separate out some of them as new species. It must be remembered that while plants grow in what forms they will in a state of nature, species are man-made and botanists are not always agreed on the extent to which related plants should be separated from one another as species.

As a result of his studies, T. Nakai, in 1940, placed thirty-three species and three botanical varieties in

the genus *Camellia* and at the same time transferred several species to other genera that at one time or another had been classified as camellias. F. Gagnepain, who used the genus *Thea* instead of *Camellia* for his species, added twelve new ones from Indo-China in 1942. Whatever disposition is made of these and other classifications by botanists in the future, it is safe to say that probably sixty-five or more different plants, based on what is known of them now, will be included in the genus *Camellia*. Since camellias are prized for their beautiful flowers and fine foliage, many of the species, measured by these requirements, do not rank high as ornamental plants and therefore they are not likely to be brought into cultivation.

Nakai's botanical classification

Of the total number, nine species now are known to be represented in camellia collections in the United States. These are *C. cuspidata, hongkongensis, japonica, mali-flora, oleifera, reticulata, saluenensis, Sasanqua* and *sinensis*. There is the possibility that others may have come in under horticultural varietal names and have been classified in nursery catalogues under species to which they do not belong. Seeds also have been imported, and among the plants grown from them there may be species not now known to be in the United States. Seeds of *C. oleifera* have been brought in with seeds of other species and plants produced from them. There is need for additional botanical study of camellia species and varieties now growing in the country.

Camellia species in the United States

Camellia cuspidata

C. cuspidata (Kochs) Veitch. Shrub or small tree to 4 or 5 m., branches slender, thinly covered with foliage; leaves purplish when young, later green, glabrous, lanceolate to elliptic, 3.5 to 7.5 cm. long by 1.5 to 2 cm. wide, bases round or slightly tapered, apices acuminate to caudate, usually tapered to long slender points, margins finely, shallowly serrulate; flower buds globose;

flowers single, white, 3 cm. expanded, scentless, *usually borne singly in axils of leaves along the twigs* or in clusters of 2 to 5 at the ends of twigs; calyx green, sepals triangular; petals 5, thin, cupped; stamens numerous in a compact mass; ovary glabrous; fruit a thin-walled capsule with *a single globose seed.*

C. hongkongensis Seeman. Tree, well branched, upright to a height of 10 to 12 m.; leaves thick, coriaceous, purplish or olive-lead colored at first, later dark green, oblong to oblong-elliptic, 10 to 12 cm. long by 2.5 to 3.5 cm. wide, bases tapered, apices tapered to a sharp point (acuminate), *margins shallowly crenulate or almost entire;* flowers 5 to 6 cm. expanded, red, cup shaped; *calyx stiff, upright, persistent in fruit;* stamens shorter than the petals, united one-half to two-thirds their length to form a wide fleshy tube; styles 3 or 4 *separate to their bases;* ovary hairy; capsule subglobose, hard, woody. There are no named horticultural varieties, and it is known only in its original or wild form.

Camellia hongkongensis

C. japonica Linnæus. Shrub or small tree to 15 m., well covered with foliage, forming a dense dark mass, *glabrous;* leaves broadly oval, 5 to 10 cm. long, smooth, dark glossy green, bases rounded or tapered, apices abruptly acuminate, margins serrulate-crenulate; flowers commonly scentless, borne on short, stout pedicels, covered with bracteoles, these and the calyx early deciduous leaving the fruits on bare stalks; petals 5 to 7, roundish or obovate, white, red or variegated, firmly attached to the stamen cylinder; *stamens and petals not separating but falling together; ovary glabrous;* fruit a hard, woody capsule, pyriform, globose or subglobose, usually with 3 locules, loculicidal; seeds dark brown, flattened on one side, rounded on the other or subglobose. It has been a favorite camellia in cultivation for hundreds of years, and varieties in large numbers and wide va-

Camellia japonica



CAMELLIA SALUENENSIS

Natural Size. Drawn from specimens grown in Cornwall. Upper twig with loose open bloom, lower twig with more compact flower.

riety have been derived from it. In recent years, camellia shows held in towns and cities of the camellia areas of the United States have done much to popularize Japonicas and extend the knowledge of them.

When Linnæus established the name *Camellia japonica* in 1753 based on Englebert Kæmpfer's article in "Amœnitatum Exoticarum" (1712) he passed over the fact that Kæmpfer had described two different species of camellia plants, *C. japonica* and *C. Sasanqua*.

C. maliflora Lindley. Shrub or small tree to 5 or 6 m., branches upright (fastigiate) forming a compact plant well covered with foliage; leaves thin, leathery, small, 3.5 to 5 cm. long by 2 to 3 cm. wide, elliptic to ovate-elliptic, curved, slightly keeled, bases rounded or tapered slightly, apices mostly abruptly sharp pointed, margins finely serrulate; *flowers incomplete double*, 3.5 to 5 cm. wide, white shaded rose in outer parts; calyx small, green, slightly cupped; petals oblong or almost round; stamens single or in fascicles shorter than and hidden among the petaloids; pistil malformed. All parts of the flowers are firmly joined to one another and *when they fall they are still united* even including the pedicel. The single-flowered form of *C. maliflora* is not in cultivation. No doubt it is native somewhere in the hinterland of China.

Camellia maliflora

C. oleifera Abel. Shrub or small tree to 7 m. of irregular habit; leaves stiff, coriaceous, *dull matt green*, 4.5 to 7 cm. by 2 to 3 cm., bases rounded or tapered, apices acute to acuminate, with a blunt or sharp tip, margins serrulate with *serrations of irregular sizes;* flowers single, white, small; calyx deciduous in fruit; stamens in a close central boss, united at the very bases or up to 5 mm.; ovary hairy; capsule woody, about 2.5 cm. by 2 cm. This species, though not commonly recognized, is found here and there in the camellia areas of the

Camellia oleifera

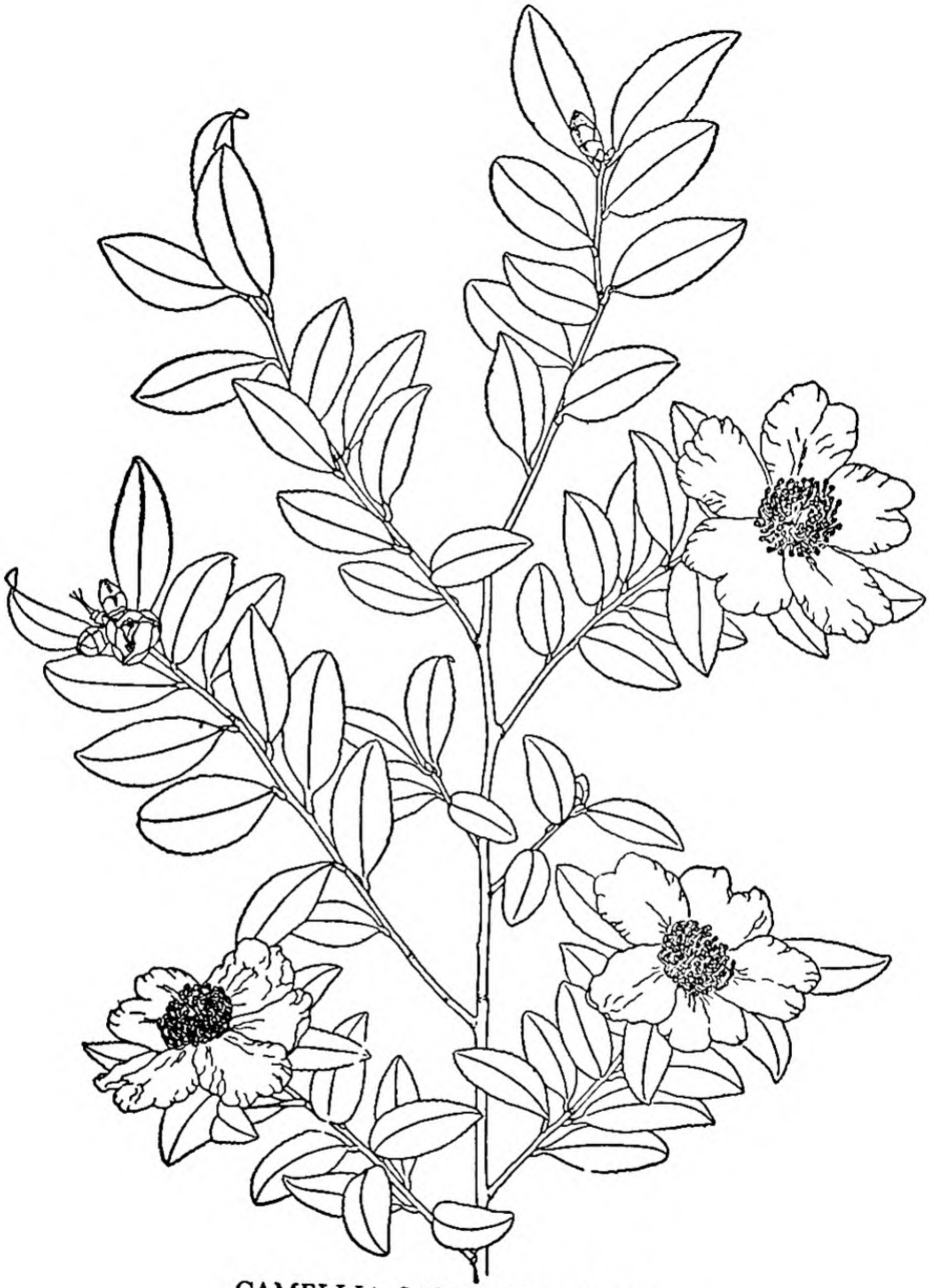
United States. It appears to have come in with seeds of other camellias, and more recently additional seed importations have been made. In England, there are specimens in the collections at the Royal Botanic Gardens, Kew, and at the nurseries of Hillier & Sons, Winchester. A number of specimens of *C. oleifera* have been added to the camellia collection of the Florida Agricultural Experiment Station, Gainesville, Fla.

Camellia reticulata

C. reticulata Lindley. Openly branched tree to 10 m. or more; leaves borne near ends of twigs, broadly elliptic, usually about 10 cm. long by 4 cm. wide, stiff, coriaceous, curved, keeled, *dull green above*, light glossy green beneath, *veining showing plainly*, bases tapered, apices acuminate, *margins finely, regularly serrulate;* flowers semi-double to incomplete double, large, usually 10 to 12 cm. across but sometimes larger; petals obovate, *hairy on the back* or under surfaces, united with the stamens; stamens 3 to 4 cm. long, *anthers becoming dark brown or black shortly after opening of flowers;* ovary tomentose; fruit globose, 2.5 cm. in diameter, tan colored, hairy (not borne by the type). Single-flowered plants of this species, grown from seed collected by George Forrest in Yunnan, China, are now growing in England. Recently horticultural varieties belonging to the species *C. reticulata* have been secured from Yunnan and are now growing in the United States and England.

Camellia saluenensis

C. saluenensis Stapf. Shrub or tree to 5 or 6 m., well branched, well provided with foliage; young twigs hairy; leaves coriaceous, glossy dark green above, lighter beneath, *oblong* or *oblong-elliptic*, 3.5 to 5 cm. long by 2 to 2.5 cm. wide, *bullate*, bases rounded or tapered, apices usually obtuse, sometimes acute, *margins finely regularly serrulate*, petioles pubescent; flowers 5 to 6 cm. expanded, white to crimson, not scented; petals obovate, notched; stamens forming a cylinder, adnate



CAMELLIA SASANQUA, ROSEA

with petals; ovary hairy with white hairs; style 3-parted at apex for about 4 mm.; fruit globose, 2.5 cm. diameter, tan colored; seeds globose or flattened on one side, dark brown, 1 cm. Native in Yunnan, China. A considerable number of plants of this species are growing in England. It has recently been brought to the United States. There is no doubt that varieties derived from it will prove a valuable addition to the camellias now grown in America.

C. Sasanqua Thunberg. Shrub to 3 or 5 m., upright or spreading, much branched; *twigs hairy* when young; leaves closely spaced, small, 3 to 5 cm. long by 1.5 to 2 cm. wide, elliptic to oblong-elliptic, smooth, leathery, dark glossy green, apices *blunt pointed*, *bases tapered or rounded*, *margins crenulate;* flowers for the most part opening in autumn, medium size, *sweet scented but with a musty underscent on close contact;* petals 5 to 7, loosely attached; petals and stamens loosely connected, falling separately; stamens flared; ovary pubescent; fruit subglobose or ovoid, pubescent when young. Cultivated forms are mostly single flowered, but there also are some varieties with double or partly double flowers. This species was described as "A small kind of Tsubakki, with single red flower" by Englebert Kæmpfer (1712) under the name Sasanqua. It was passed over in 1753 by Linnæus, who did not recognize it as different from *C. japonica*, which he named. It remained for his pupil Carl P. Thunberg to describe and illustrate it (plate 30) in his "Flora Japonica," 1784. The name Sasanqua is an old Japanese name for the species, first used in western literature by Kæmpfer.

Camellia Sasanqua

C. sinensis (L) O. Kuntze. Shrub or sometimes a small tree to 8 or 9 m., shrubby forms compactly branched; twigs slender, bright brown; shoot buds green, flat, thin, short, slightly curved; leaves variable



in shape and size, lanceolate, elliptic-lanceolate or oblong-lanceolate, up to 15 cm. long or longer, by 4 to 5 cm. wide, thin, leathery, acute or obtuse *with small notch at tip*, dark, bright green, *bullate*, margins crenulate, veins distinct, depressed on the upper surface, elevated beneath; flower buds globular; flowers single, white, solitary or 2 to 4 together, nodding on curved pedicels, fragrant; *calyx persistent in fruit;* ovary hairy, fruit a woody capsule, usually 3-celled; seeds ovoid to globose.

Linnæus named and classified the tea plant as *Thea sinensis* in 1753. In 1881 it was placed in the genus *Camellia* by O. Kuntze. Usually it is not prized as an ornamental, but it is regarded as an unusual plant because tea is made from its dried leaves. At one time it was believed that "black tea" and "green tea" were produced by two different kinds of plants, but later it was determined that the difference in these teas was caused by the method of drying and preparation and that they both came from the same species. The word "tea" is of Chinese origin and in the English language has come to mean an infusion made from plant leaves or other plant parts, not only of the tea plant but of many other kinds of plants. The tea plant has been in cultivation for so many centuries that the exact location where it is native is in doubt. The problem of its native habitat is complicated further by its escape from cultivation in many places. While it is generally agreed that there is only a single species, there appear to be two well-marked botanical varieties, one from Assam to Indo-China, the other belonging to northwestern Yunnan, China.

The tea plant

Because of the large number of varieties of camellias that have been derived from certain species and the certainty that there will be further additions, it is advisable to divide camellias into horticultural groups based

on the source species from which they have originated. The groups used here are named for the species from which they are derived, and hybrids (crosses between species) are placed in the group to which the parent belongs that they most closely resemble. This is really a horticultural-botanical grouping. At this time, the following groups are recognized:

Camellia groups

Cuspidate Group, derived from *C. cuspidata*
Japonica Group, derived from *C. japonica*
Reticulate Group, derived from *C. reticulata*
Saluen Group, derived from *C. saluenensis*
Sasanqua Group, derived from *C. Sasanqua*
Sinensis Group, derived from *C. sinensis*

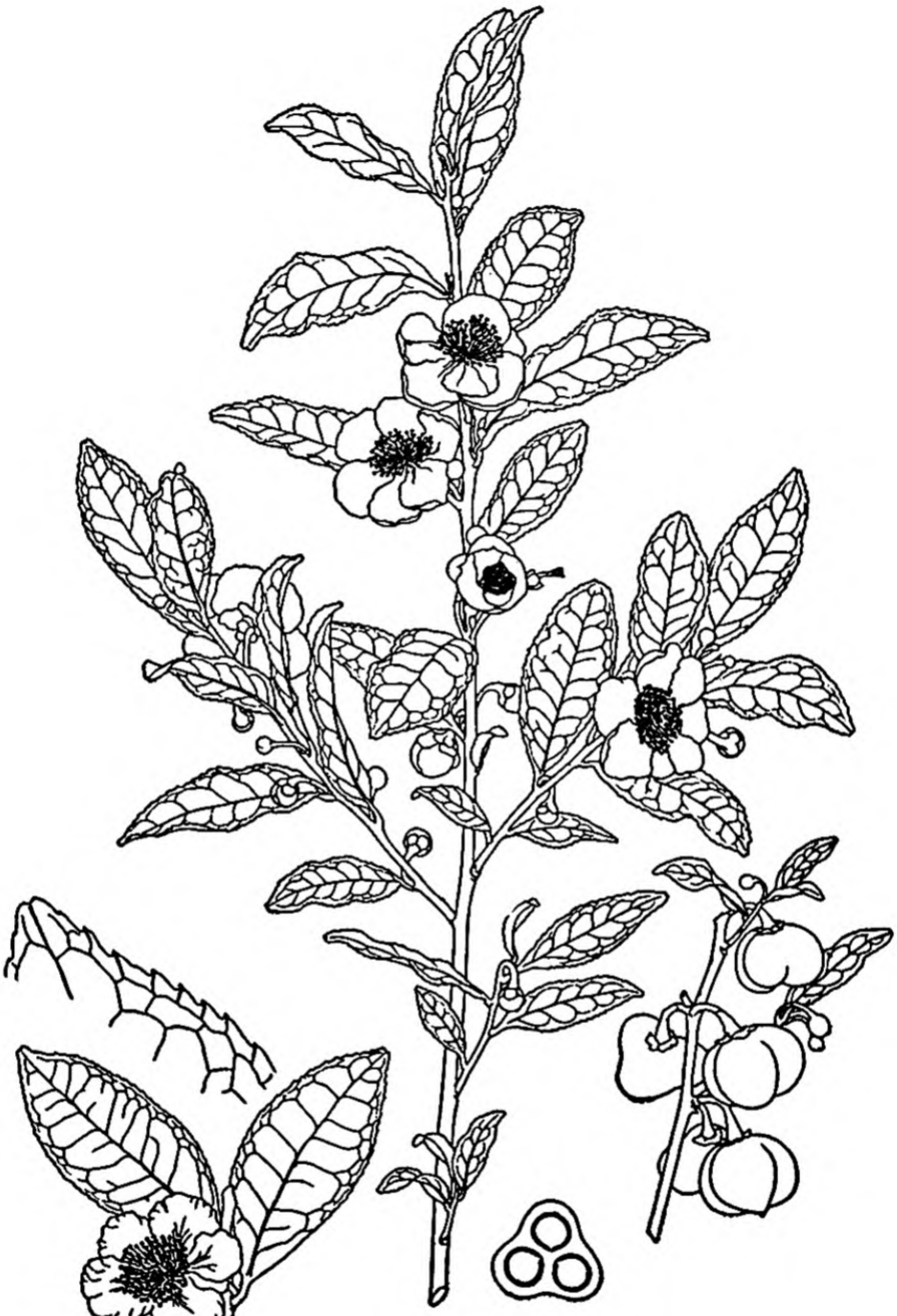
No groups are proposed for *C. hongkongensis*, *C. maliflora* and *C. oleifera* because so far as known these species are represented in cultivation by only a single form (*C. maliflora*) or by unselected forms (*C. hongkongensis* and *C. oleifera*) that do not differ from wild plants. In England, at least three other species, *C. salicifolia*, *C. taliensis* and *C. Tsaii*, are growing.

In the future through hybridizing and crossing, the number and forms of camellia varieties are likely to be increased greatly. Opportunity in this direction is unlimited because of the number of species and horticultural varieties now available for breeding work. New varieties secured can be assigned to the groups they most closely resemble, or in case they are widely different other groups can be added to include them.

Each species is marked by certain peculiarities that are useful in separating it from the others. The most noteworthy characteristics of those now growing in the United States are given below.

Peculiarities of species

Calyx persistent in fruit—hongkongensis, sinensis
Flowers white—cuspidata, oleifera, sinensis



CAMELLIA SINENSIS

Twig, leaf tip and margin enlarged; fruit and cross section of fruit.

Flowers scented—Sasanqua, sinensis, some others not classified
Flowers partly double—maliflora, reticulata
Flowers with petals and stamens loosely attached—Sasanqua

Peculiarities of species

Flower buds globose—sinensis
Flower buds elliptic-ovoid—cuspidata, japonica, Sasanqua
Leaf margins finely serrulate—maliflora, saluenensis, reticulata
Leaves peculiarly colored when young—cuspidata, hongkongensis
Leaves dull green—oleifera, reticulata
Leaves smooth, glossy, thick—japonica, Sasanqua
Leaves usually bullate—saluenensis, sinensis
Leaves large, acuminate—hongkongensis, reticulata
Leaves small—maliflora, saluenensis, Sasanqua
Leaves usually lanceolate with sharp slender points—cuspidata
Leaves with plainly visible veins—reticulata, sinensis
Leaves with blunt tips—Sasanqua
Ovary glabrous—cuspidata, japonica
Ovary hairy or pubescent—hongkongensis, maliflora, oleifera, reticulata, saluenensis, Sasanqua, sinensis

4

CAMELLIA CLASSIFICATIONS

BOTANISTS long ago realized the difficulties of carrying on systematic studies of flowering plants without some system of classification that could be used to divide them into workable groups. As knowledge of plants extended and larger numbers became known, it was increasingly difficult to deal with them. Many attempts at a solution were made before a reasonable plan based on flower structures came into use. There were great differences of opinion on a proper basis for such a classification, and there was much discussion, some of it acrimonious. Even now changes are still being made in plant groups to conform to new knowledge of relationships and to take care of new findings.

Need for classification

Later on those who dealt with horticultural plants also found themselves in difficulties because of increasing numbers. They, too, found it necessary to divide varieties into groups having certain characters in common, and these were given group names. One of the earliest attempts was with roses, which were divided into groups based on the sources from which they were derived. To some extent this basis still is followed in such groupings as Hybrid Perpetual, Tea, Hybrid Tea, Polyantha roses and many more. A classification based on form was also worked out. Such a classification, one of the earliest made for any horticultural group of plants, was published in the rose catalogue of Prevost Fils, Rouen, 1829. In it roses were divided into *simple*, *semi-double*, *double*, *multiple*, *tres-multiple*, *pleine* and *tres-pleine*.

Berlèse, who listed and described a very considerable number of camellias, after he had been working with

them for twenty years, realized the necessity for dividing them into groups. This he did, using color as a basis in his "Monographie du Genre Camellia" in 1837. He set up a color classification with these groups:

The first Berlèse classification

First Gamut—pure white, to rose, to cherry, to amaranth, to purple

(a) Self- or solid-colored
1. Pure white
2. Clear rose
3. Clear cherry-red
4. Deep cherry

(b) Bicolored (two colors)
1. White ground, striped or spotted with rose
2. Rose ground, striped or spotted with cherry-red
3. Ground clear or deep cherry spotted with white

Second Gamut—yellowish flesh (dingy white), to flesh, to deep orange, to poppy colored

(c) Self- or solid-colored
1. Flesh-colored
2. Orange-red, more or less deep

(d) Bicolored (two colors)
1. Ground yellowish flesh, striped with white
2. Ground orange-red, clear or deep, striped or spotted with white

To accompany his classification and the descriptions of varieties, he furnished a color chart, arranged in two gamuts with colors ranging from light to dark in each of them. This is one of the first color charts published, forerunner of several of recent years.

Berlèse found his color classification was "insufficient and incomplete," to use a translation of his own statement, and moreover it was difficult to follow. Hence in 1844, in the "Annales de la Société Royale

d'Horticulture de Paris," he presented another classification based on form and the resemblance of camellia blossoms to those of other plants—anemone, peony, rose, ranunculus and waratah. These, plus simple (single and semi-double) forms, completed the divisions or sections of his second classification. In some respects this followed the lines of the Prevost rose classification of 1829.

He illustrated his second classification with drawings in his "Monographie," 3rd edition, 1845, and described the five double and nearly double forms as follows:

Second classification by Berlèse

"The *anemoniform* corolla is that which has only two or three rows of exterior petals, and the sexual parts of which, being in a more or less petaloid state, form an anemone-like center. Ex.: *C. Elegans Chandlerii.*

"The *peoniform* corolla is that which has a circumference composed of only 2, 3 or 4 rows of broad petals, and has its sexual parts transformed into petals which are complete, but unequal and misshapen, and the ensemble of which forms a center which is broad, bushy, shingled and convex, as that of the officinalis peony. Ex.: *C. Colvillii.*

"The *rosiform* corolla is found under two different forms: First, a *semi-regular rose* with broad exterior petals arranged in 3, 4 or 5 rows overlapping at a distance; a center which is indeterminate, concave and more or less stuffed; stamens more or less visible. Ex.: *C. Derbiana, C. Rosa sinensis.* Secondly, an *irregular rose* with diverse, shriveled, twisted, unequal exterior petals; a uniform convex center. Ex.: *C. Variegata, C. Rex Bataviæ.*

"The *ranunculiform* corolla is one which overlaps regularly throughout its circumference, with a center which is almost always concave and with petals which

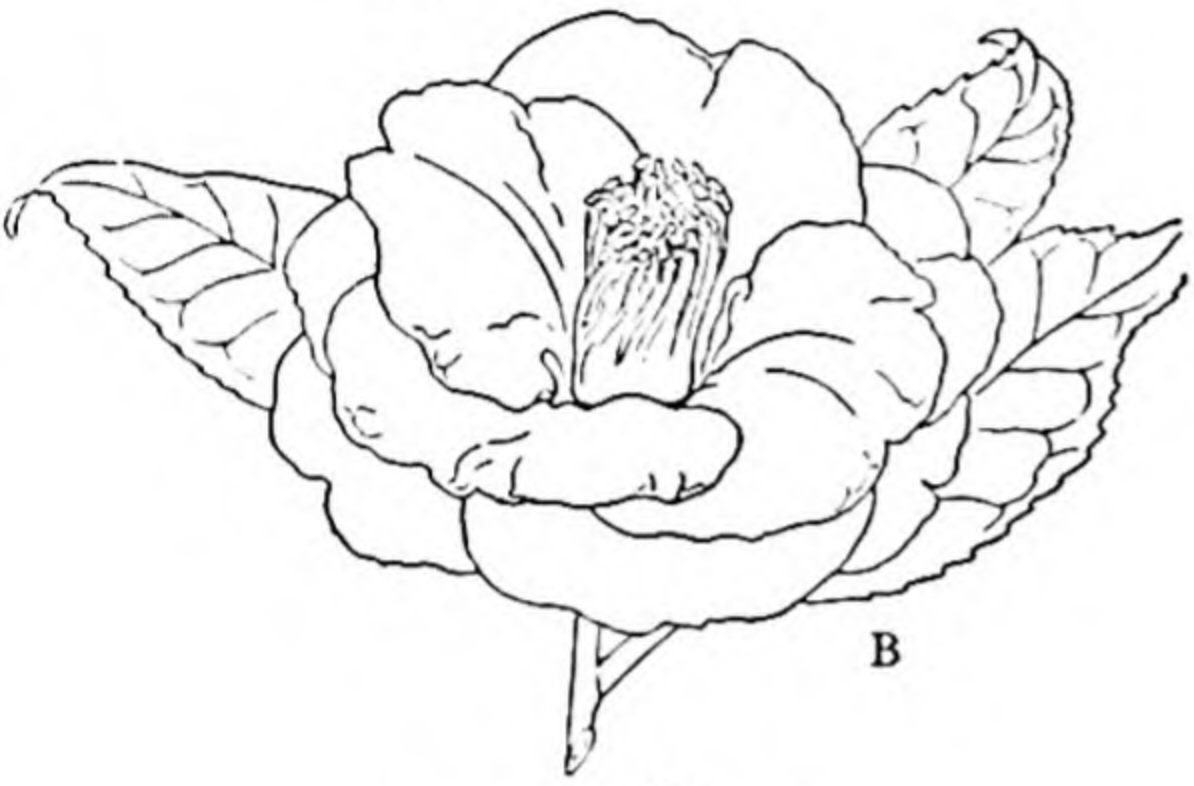


A

Section I. Simple. Stamens all central united or in fascicles forming a central group or mass.

A. Single. Normal corolla of 5 to 7 or occasionally 9 petals—Kimberley.

B. Semi-double. Petals more than 9, usually 14 to 21—Tricolor.



B



A

Section II. Incomplete Double. Petals numerous with single stamens or groups of stamens intermixed in the center of the flower, forming an irregular mass.

A. Petals all large, with stamens mixed among them—Gloire de Nantes.

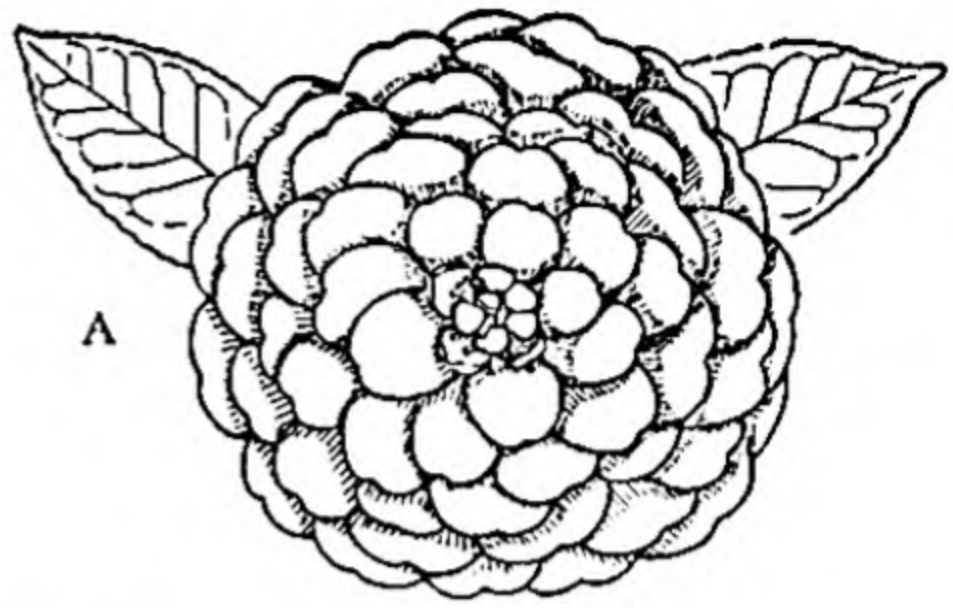
B. Petals all small intermixed with stamens—Elegans.



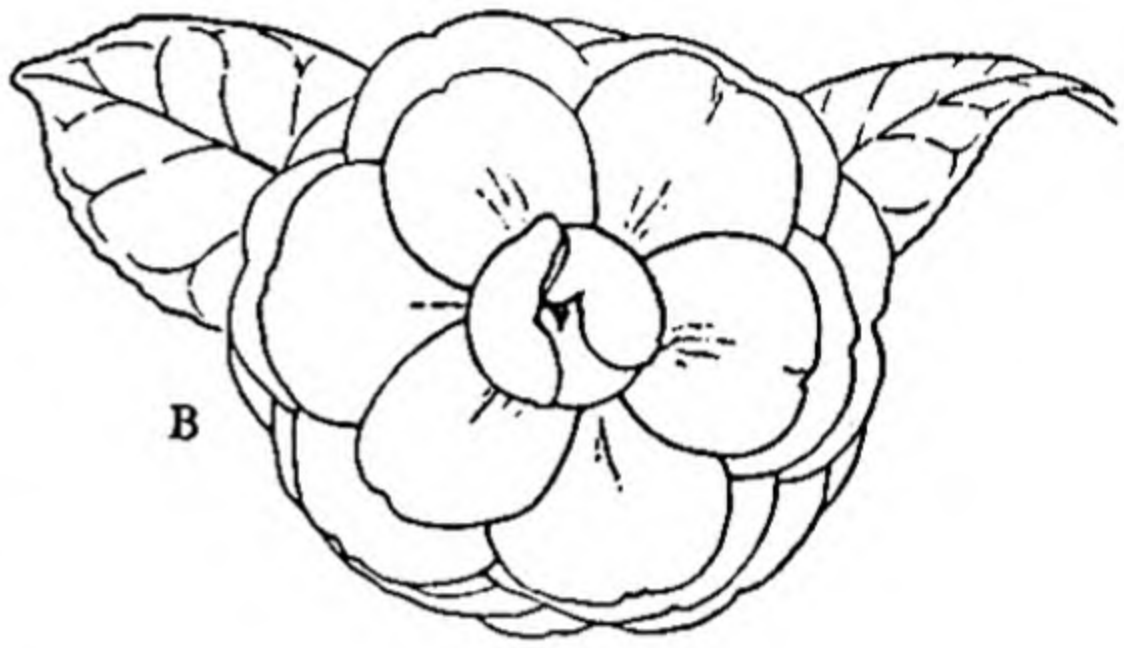
B

Section III. Complete Double. All stamens have been changed to petaloids, or if any remain they are hidden under or among the petaloids.

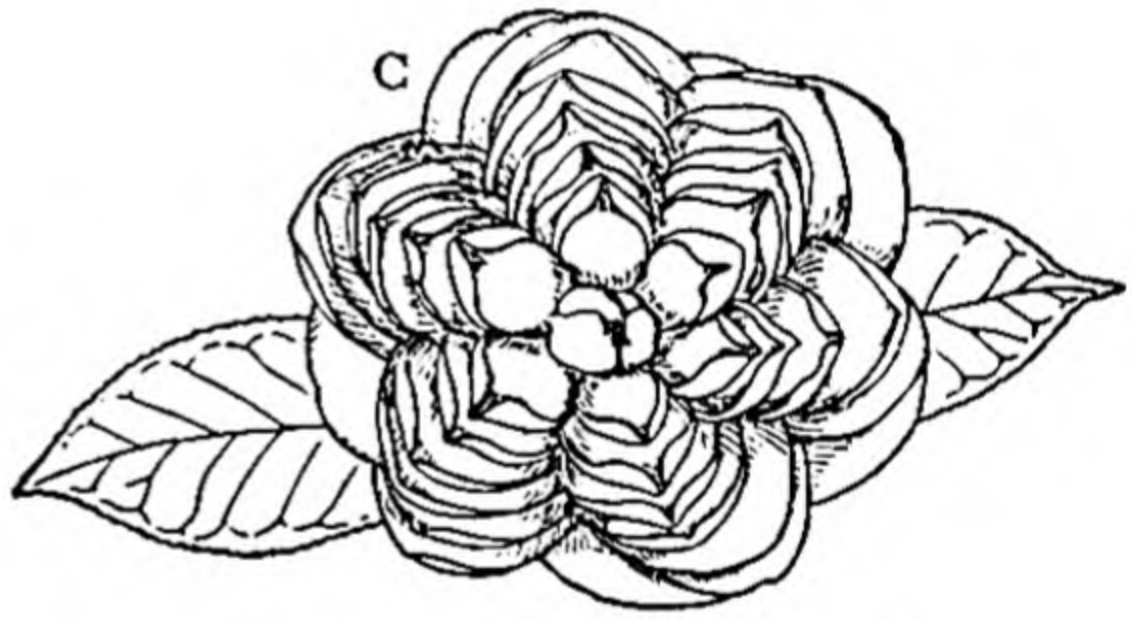
A. Regular Imbricated. Petaloids regularly overlapping from center to edge of flower —Alba Plena.


A

B. Incomplete Imbricated. Petaloids imbricated except for a relatively large unopened bud-like center—Mathotiana.


B

C. Tiered. Petaloids arranged in six tiers or rows from flower center to edge giving a star-like effect—Candidissima.


C

D. Irregular. Petaloids usually small, spatulate or strap shaped, arranged irregularly in a convex mass—Prof. C. S. Sargent, Debutante.


D

are close together much like those of a buttercup. Ex.: *C. Alba plena.*

"The *waratiform* or *pomponiform* corolla has the petals of its circumference arranged in one or, at the most, two rows, with sexual parts all transformed into petals which are perfect, elongated, thong-shaped, uniform, equal, the ensemble a sphere or pompon, like the old *Waratah*, *Vespucius*, *Hebra*, *Rubina*, etc."

This second classification has been used to a considerable extent as a basis for staging camellia flower shows and in describing the forms of blossoms. Several modifications have also been worked out.

Colla's classification

This form classification was preceded in part by one published by Dr. Luigi Colla in his "Camelliografia," Torino, Italy, in 1843. It was based on a combination of form and color. The forms he proposed were simple, partly double, double and waratah, and the main sections of his color groupings were red, white and variegated. His small book is a rare item and quite generally his classification has escaped notice.

Several years ago it was realized that another classification was desirable, and a study of the anatomy or structure of camellia flowers was undertaken in the hope that a satisfactory basis for a simple system could be found. It was known, of course, that in camellias as in other plants doubling of the flowers is brought about by the changing over (metamorphosis) of stamens to petals or petal-like parts, but how so many different shapes and sizes of petals could be formed had not been determined. This study of flower anatomy extended over several seasons, and large numbers of flowers were examined. It came to light that petals had not only replaced single stamens quite commonly, but that petals of different sizes take the place of groups or fascicles of stamens. Stamens in

camellias are numerous in single flowers, and this together with the way in which they are joined together and to the corolla laid the groundwork for the many forms found in the flowers. These structural peculiarities made possible almost endless variations in petal forms.

Camellia classification based on anatomy

Based on the anatomy of camellia flowers of various types, a new classification was worked out and tested in gardens and at flower shows. Stated in simple terms this classification is based on (1) the transformation of stamens to petal-like parts, (2) the extent to which this metamorphosis has taken place, and (3) the size and form of the petals. It was published in the "Bulletin of the Garden Club of America," June, 1942. In it, camellia flowers are grouped in three sections made up of nine groups as follows:

SECTION I. Simple
- A. Single
- B. Semi-double

SECTION II. Incomplete Double
- A. Petals large
- B. Petals small
- C. Petals large and small intermixed

SECTION III. Complete Double
- A. Regular imbricated
- B. Incomplete imbricated
- C. Tiered
- D. Irregular

These several classification groups are illustrated, except Section II C, which is really a combination of Section II A and B, by drawings of typical forms on the adjoining pages, with further descriptive details. Doubling in all camellia varieties derived from the four principal species from which garden plants have been

secured, *C. japonica*, *C. reticulata*, *C. Sasanqua* and *C. saluenensis*, follows the same pattern, and this classification is adapted to grouping and describing all of them regardless of the source from which they have come. Doubling of camellia flowers in all cases results from the metamorphosis of stamens into petal-like parts, and the resulting forms, therefore, are similar.

This classification makes it possible, in describing camellia flowers, to assign them to a section and group, thereby indicating their general appearance. To say that a flower is single, semi-double, incomplete double, double imbricated, double tiered or double irregular, covers an important part of its description in a very brief statement. It is valuable in grouping varieties in a flower show, though it must be kept in mind that the group name is applied to the specimen or specimens in hand and not necessarily to all the flowers of a particular variety. This or any other classification can apply only to a definite flower specimen. Such specimens may or may not represent all the flowers produced by a variety of camellia. Those of some varieties conform very closely to a single type, but there are others in which more than one form of flower is found on the same plant. Classification is also helpful in identifying specimens, because it breaks up the mass of varieties into smaller groups.

5

JAPONICA CAMELLIAS

JAPONICAS are the most important camellia group. Since the beginning of camellia culture they have received the major share of attention, until now in number and variety of forms they far surpass any other group or, for that matter, all other groups combined. Those named, propagated and described, some of them very scantily, run into thousands. It is probably true also that Japonica camellias exceed in numbers the varieties belonging to any other group of woody plants derived from a single species. Very occasionally, in older literature, there is a reference to a hybrid camellia of which *C. japonica* was one of the parents, but there is grave doubt as to whether such camellia hybrids ever existed. In more recent years, particularly in American literature, varieties are referred to as hybrids. Naturally the question can be asked, "Hybrids of what?" To this there is no answer, and their only claim to hybridity comes from the loose use of the word hybrid. Hybrids are secured by crossing varieties or kinds of camellias belonging to different species. A camellia resulting from a cross between *C. saluenensis* and *C. japonica* is a hybrid, but a plant secured by crossing Kimberley with Elegans, both of them Japonicas, is not a hybrid. In recent years, a few real hybrids have been produced in England with *C. japonica* as one of the parents, and there probably are hybrids among the great number of varieties still in the Orient, but few have reached America.

Japonica hybrids

Someone may ask, "What about the great numbers of roses, as compared with camellias; are they not more numerous?" It is true, of course, that roses

greatly exceed camellias in numbers, but roses are mongrel plants into the origin of which many different species of the genus *Rosa* have entered. On the other hand, Japonicas are pure descendants of a single species, and the wonder is that there are so many of them in such varied forms.

Sources of Japonica varieties

Japonicas now in America have come from several different sources: (1) the Orient, China and Japan, (2) Europe, the western countries, principally England, France, Belgium, Germany and Italy, (3) the United States and (4) Australia, more recently. Oriental Japonicas were brought to Europe, among them some that were capable of producing seeds; seedlings were raised and new varieties selected. These also came to America, and particularly in the period from 1830 to 1860 most of the varieties brought to Europe from the Orient or originated in Europe were imported. Many seedlings also were raised and handled in northern greenhouses located in or near the cities of the Atlantic seaboard. Then in later years, there have been large importations from the Orient, principally from Japan, by E. A. McIlhenny, G. L. Smith, T. Kiyono, Doty & Doerner, T. Domoto and others. Seeds also have been imported, and some meritorious Japonica seedlings have been secured in that way, notably by K. Sawada.

A very large interest in securing new varieties has developed in recent years, and to this end seedlings are being raised. In view of what already has been done, it might seem that all variations possible have been secured, but this is not so. *C. japonica* appears capable of giving new sorts, although without doubt it will be more difficult to secure ones that are different and superior. At any rate, the end is not yet in sight.

There has been a definite breaking away in the newer trends from the old formal Japonica flowers so

highly prized at one time. This may be due to two causes: (1) that complete double imbricated varieties are more difficult to obtain, and (2) it is more likely true that those who grow and work with camellias are more interested in the informality of form or shape and color so characteristic of the incomplete double group. At any rate, this group of Japonicas is in the ascendancy in public favor at this time, and even the simple single and semi-double varieties are receiving a larger share of attention. After all, the simple beauty of a single flower at its best is not surpassed in any other form group. In this connection, there have been some recent additions to the singles, made up of such varieties as Amabilis, Daitairin, Oranda-gasa and Pink Poppy, all with flared stamens that are particularly lovely. There is also another group of more double varieties, represented by Imura, Magnoliæflora, Matsukasa and White Pine Cone with curved petals, elevated above and not lying flat on one another, which constitute a pleasing departure from older forms.

Preferences in camellia forms

In the following descriptions, the color chart of the Royal Horticultural Society has been followed. Flower measurements are given in the metric or French system because it lends itself to small measurements; if it is kept in mind that 10 centimeters closely approximate 4 inches, there is no particular difficulty in converting to inches or fractions thereof.

Single-Flowered Japonicas. Stamens all central. Petals 5 to 7, occasionally 9.

Alba Gigantea, Amabilis, C. F. Coates (hybrid), Daitairin, Kimberley, Mihata, Oranda-gasa, Pink Poppy, Shu-beni-hitoe, Suibijin.

Semi-Double-Flowered Japonicas. Stamens all central. Petals more than 7, usually 14 to 20.

Adolphe Audusson, Akebono, Anita, Anna Lee, Donckelari,

Finlandia, Flame, Fred Sander, Goshoguruma, Haku-tsuru, Imura, Jessica, Lady Clare, Lady Vansittart, Magnoliæflora, Mermaid, Monjisu, Nagasaki, Rev. John Bennett, Smiling Beauty, Snowdrift, Tricolor, Ville de Nantes.

Incomplete Double-Flowered Japonicas. Petaloids numerous, with single stamens or fascicled stamens or both intermixed to form a central irregular mass. This group also divided on basis of sizes of petaloids.

Bessie McArthur, Colletti, Daikagura, Duchess of Sutherland, Eleanor of Fairoaks, Elegans, Elizabeth Boardman, Eugene Lize, Frizzle White, Gigantea, Haku-rakuten, Herme, Hishi-karaito, Jarvis Red, Kenny, Kumasaka, Lila Rosa, Lindsay Neill, Margaret Walker, Martha Brice,. Matsukasa, Mrs. Charles Cobb, Nobilissima, Pæoniæflora, Peach Blossom, Pink Star, Prima Donna, Queen Bessie, Rev. John G. Drayton, St. Andre, Virgins Blush, White Empress.

Camellias in this chapter grouped by forms

Complete Double-Flowered Japonicas—Regular Imbricated. Petals regularly imbricated from circumference to center, either completely or with only a small unopened remnant in center.

Alba Plena, Catherine Cathcart, C. M. Hovey, Coquetti, Countess of Orknęy, Eleanor Hagood, Fimbriata, Frau Minna Seidel, K. Sawada, Lady Humes Blush, Lallarook, Madame Haas, Mrs. K. Sawada, Shira-giku.

Complete Double Japonicas—Incomplete Imbricated. Petals regularly imbricated except for a large unopened center.

Mathotiana.

Complete Double Japonicas—Tiered. Petals arranged in tiers or rows from circumference to center.

Candidissima.

Complete Double Japonicas—Irregular. Petaloids arranged irregularly in a convex central mass, usually small, spatulate or strap-shaped and folded.

Arejishi, Aunt Jetty, Bella Romana, Debutante, Imperator, Jubilee, Mena Ladnier, Prof. C. S. Sargent, Woodville Red.

ADOLPHE AUDUSSON. Semi-Double. Flower large, to 11 cm.; color self turkey-red 721 to rose-madder 23 with well-



CAMELLIA JAPONICA, AMABILIS



CAMELLIA JAPONICA. ANITA



CAMELLIA JAPONICA CATHERINE CATHCART



CAMELLIA JAPONICA. ELEGANS



CAMELLIA JAPONICA, ELEANOR HAGOOD



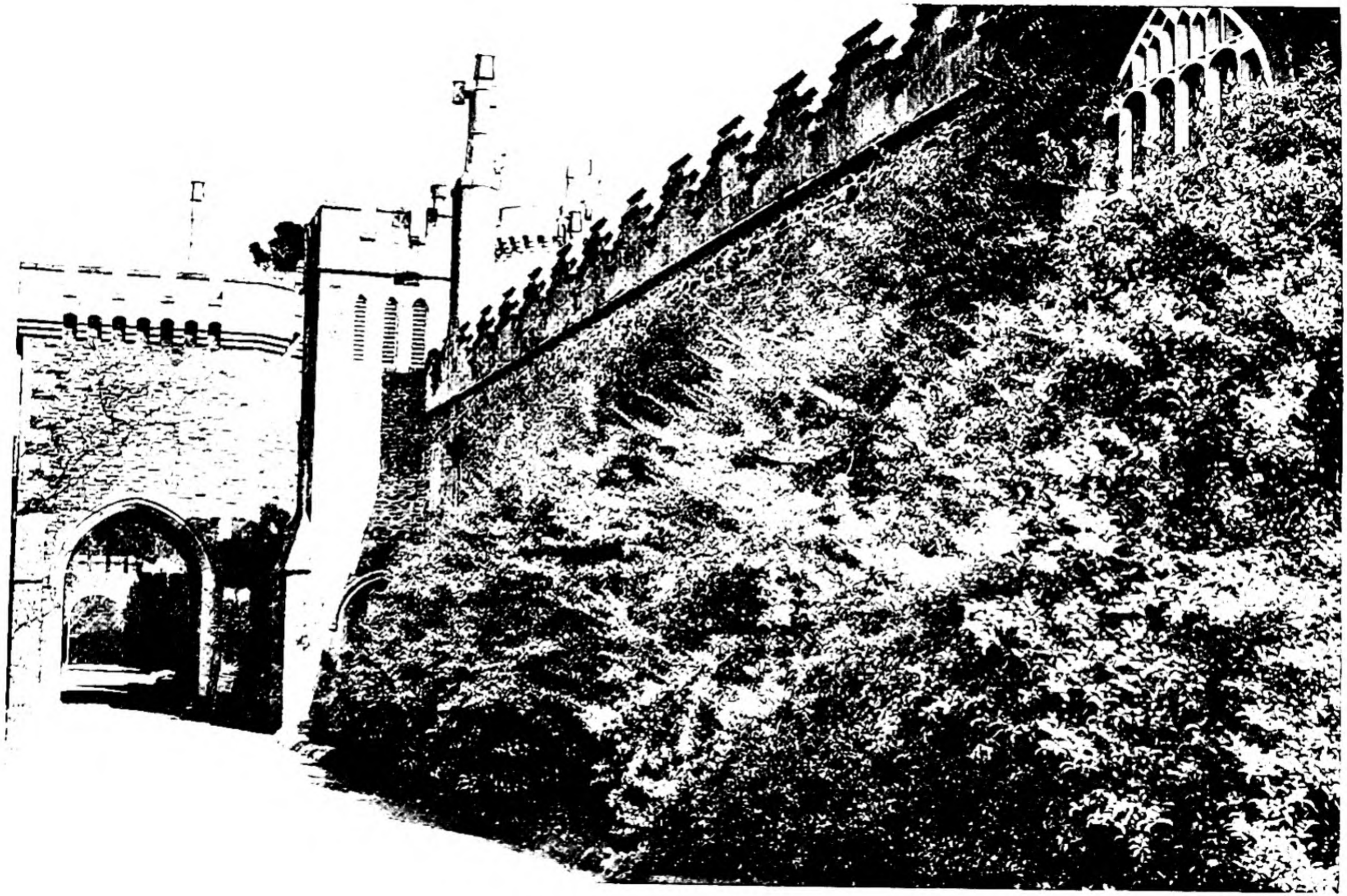
CAMELLIA JAPONICA. CONTESSA LAVINIA MAGGI



CAMELLIA JAPONICA DAIKAGURA



CAMELLIA JAPONICA. DAITAIRIN



CAMELLIA SASANQUA



CAMELLIA SASANQUA. BRIAR ROSE



CAMELLIA SASANQUA. CLEOPATRA



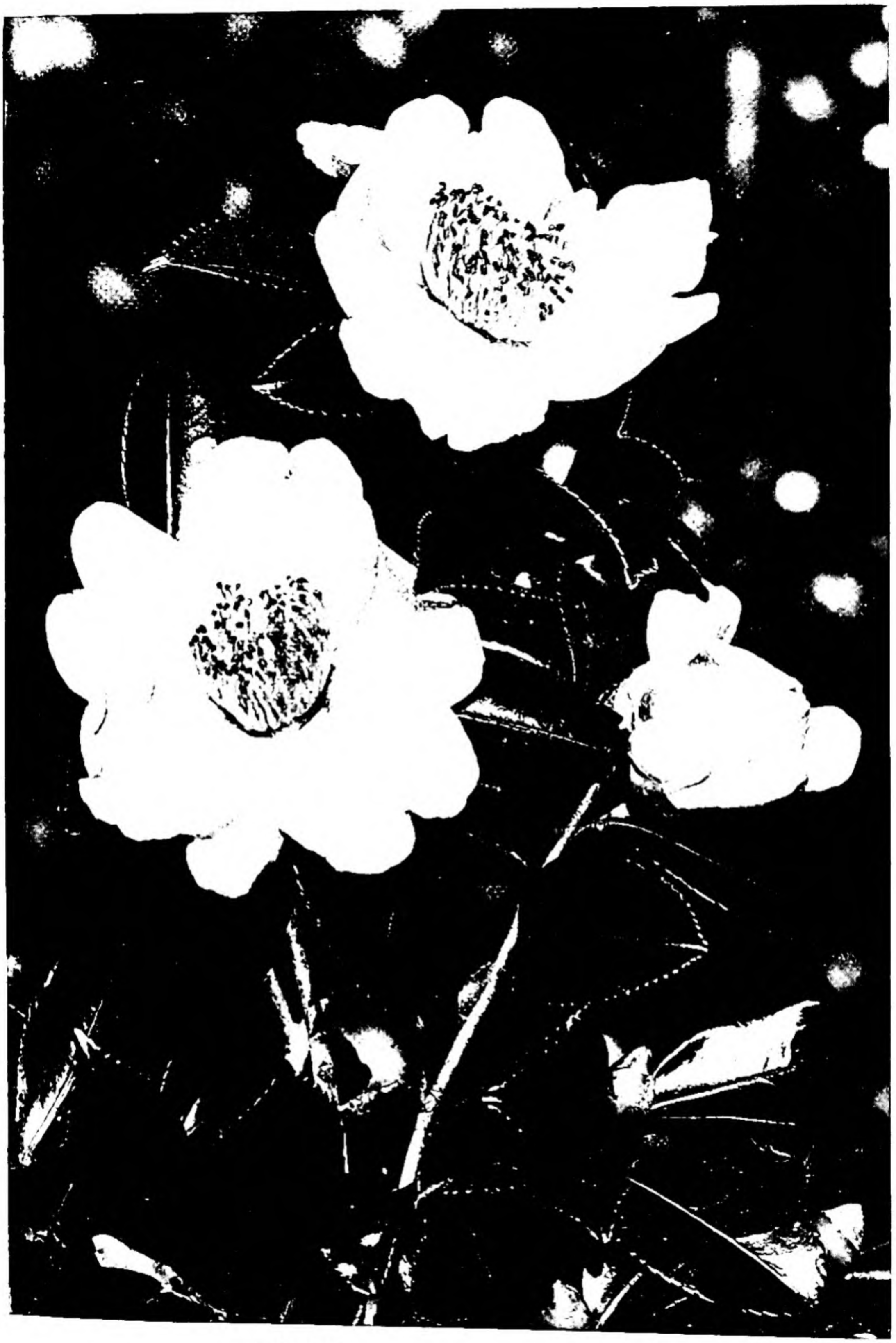
CAMELLIA SASANQUA. HANA-YUKI



CAMELLIA SASANQUA, LAVENDER QUEEN



CAMELLIA SASANQUA, MINE-NO-YUKI



CAMELLIA SASANQUA, PAPAVER



CAMELLIA SASANQUA, ROSY MIST

defined darker veins; calyx large, cupped; sepals large, hairy on exposed surfaces, outer ones dark green, thick, inner ones light green, thinner; petaloid sepals 4, pubescent, silvery near tips; petals 12 in 3 rows, large, wider than long, 4.5 cm. long by 5.5 cm. wide with a broad stout basal haft, bases unequal, apex rounded or truncate; stamens central, 107, a few small petaloids occasionally, forming a stout somewhat urn-shaped cylinder, filaments light yellow, pink tinted below, variable in length to 3.5 cm. long; pistil normal, 3-fid for half its length; leaves thick, dark green, bases tapered slightly, apices tapered to medium blunt points, margins coarsely, shallowly serrated; breaks to variegated flowers. Originated by M. Audusson, Angers, France; introduced about 1877. Illustrated in "Gardeners' Chronicle," 97, colored plate opp. p. 8. 1935.

AKEBONO. Semi-Double. Flower small to medium, 6 to 7 cm. wide by 2.5 cm. high; color tyrian-rose 24/2 and somewhat lighter; calyx upright; sepals almost round, outer ones dark, brownish green with tan margins; petals 12 to 15, the outer ones smaller than the inner, 2.8 to 4.8 cm. long by 1.8 to 3 cm. wide, obovate, apices rounded with a very slight notch, bases tapered; stamens numerous, central, compact, upright, filaments white faintly pink tinted in lower parts, 3 cm. long; style 3-fid, white, 3 cm., separated one-third its length; leaves dark green, lighter beneath, obovate-elliptic, curved, slightly keeled, bases tapered, apices tapered to a blunt tip, margins finely serrate; there is a variegated form, with darker rose stripes on a rose background; growth compact, erect. Introduced from Japan by T. Domoto, California, 1917. There is also a variegated form.

ALBA GIGANTEA. Single. Flower large to very large, 13 cm.; color self white; calyx deeply cupped, light silvery green; petals 6, large, 6 cm. long by 6 to 6.5 cm. wide, orbicular, margins entire, waved, slightly creped, apices wrinkled, bases rounded to a short medium haft; stamens numerous, light yellow, 4 to 4.5 cm. long; leaves elliptic, 7 cm. long by 4 cm. wide, medium green, curved, flat. Introduced by T. Domoto; catalogued by E. A. McIlhenny, 1941.

ALBA PLENA. Complete Double—Imbricated. Flower to 11 cm. wide, more often 9 to 10 cm. by 3.5 cm. high; color self white; calyx shallow, cupped, 4-sided, irregular; sepals light green with wide tan edges, round; petaloid sepals 3 or 4, silver tipped; petals 70 plus a number of central unopened ones, obovate, outer ones 5 cm. long by 4.5 cm. wide, gradually decreasing in size toward center, margins entire, incurved or reflexed, apices rounded with

slight notch, bases tapered; leaves very characteristic, narrow, twisted with sharp drooping points, serrations fine, sharp. Brought to England from China by Capt. Connor in 1792 and to the United States by Michael Floy in 1800. (See Chapter 2.) Free flowering, best of its form for early blooming.

AMABILIS. Single. Flower medium size, to 8.5 cm. wide; color self white; calyx somewhat triangular, 4 cm. wide; sepals 5, light green with thin edges; petaloid sepals 2 with light silvery green markings at tips; petals 5.4 cm. long by 5 cm. wide, creped around upper margins, bases rounded, crimped to short thick hafts, apices truncated; stamens 122, flared to form a cup, 2.5 cm. wide, filaments light yellow, free in upper half; leaves elliptic, 7 cm. long by 4 cm. wide, dark glossy green, bases rounded, apices abrupt with short sharp points. The flared stamens typical of a few other varieties make the flowers of this variety interesting. Years ago the name was used for another, different variety and should not have been used again. It is probably an introduction from Japan but at this time a Japanese name for it is not known.

ANITA. Semi-Double. Flower large, to 13 cm. wide by 4 cm. high; color variegated, pink undercolor, splashed, dotted and lined with carmine 21, the lines broken; calyx small, green; petals 19 in 3 rows, large, 6 cm. long by 4 to 7 cm. wide, obovate to obovate-triangular, margins smooth, apices truncate, bases tapered; stamens central, numerous, filaments white to whitish yellow, to 3 cm. long. Origin unknown; a California introduction listed by Armstrong Nurseries 1940, catalogued 1941. There are several new seedlings that closely resemble this variety.

ANNA LEE. Semi-Double. Flower large, 12 cm. wide by 2.5 cm. high; color self carmine 21/1; calyx large, green without tan edging; petals 17 in 3 rows, large, orbicular, 5.5 cm. long by 5.5 cm. wide, margins smooth, entire, apices emarginate, bases rounded to short triangular hafts, surface somewhat creped and crinkled; stamens numerous, slightly flared, divided in 5 fascicles, filaments light yellow, 3.5 cm. long; leaves elliptic, 12 cm. long by 6.5 cm. wide, curved, dark green, bases tapered, apices acuminate, curved, margins shallowly coarsely serrated. A seedling introduced by Dr. W. G. Lee, Macon, Ga.

AREJISHI. Complete Double—Irregular. Flower medium, 6.5 to 8 cm. wide by 3.5 to 4 cm. high, self turkey-red 721; calyx cupped; sepals light green, pubescent; petaloid sepals 3; outer petals 9, obovate, margins entire, apices rounded with small notch (emar-

ginate); petaloids numerous, strap shaped or small flags, a few are larger and raised above the level of the mass making an irregular surface; stamens few, hidden among the petaloids in small groups; leaves elliptic, 9 to 11.5 cm. long by 4 to 6 cm. wide, dark glossy green, curved, apices with a long slender point, bases tapered, margins with sharp, medium serrations. Introduced from Japan; valued for its early flowering.

AUNT JETTY. Complete Double—Irregular. Flower medium to large, to 10.5 cm. wide by 5 cm. high; color self turkey-red 721; calyx cupped, 4 cm. wide; sepals cupped, round, green with thin margins; petaloid sepals 5 with silvery hairy area in center at tips; outer petals 9 in 2 rows, obovate, notched at apices; flower center a mass of many petaloids with a few large ones intermixed; petaloids bent or folded; stamens few hidden among petaloids; pistil sometimes perfect, usually malformed; leaves oval to elliptic, often waved and somewhat twisted, bases tapered, apices with a medium short point, margins serrated with medium sharp points. An old specimen of Aunt Jetty at Killearn Gardens, Tallahassee, Fla., produces some flowers with a few white spots, but for the most part, flowers are self colored. Governor Mouton, named for a Governor of Louisiana of that name, is the same variety, and both names have been applied to the same camellia introduced long ago, probably originally from Europe. Flowers of Governor Mouton commonly show much more white in the variegations and fewer self-colored flowers. A first-class variety.

BELLA ROMANA. Complete Double—Irregular. Flower medium, 8.5 cm. wide by 4.5 cm. high; color variegated, carmine 21/2 to 21/3 ground, striped with carmine 21/1; calyx flat, round, 3 cm. wide, greenish tan colored; sepals medium size, tan or light, green with dark tan margins; petaloid sepals 9, folded and twisted, tipped with silvery hairs; outer petals irregularly shaped ovate to rounded ovate, 3.5 cm. long by 3.5 cm. wide, bent backward, apices notched, bases tapered; inner petaloids numerous, obovate to spatulate; stamens present, hidden; pistil malformed; leaves light green, 9.5 cm. long by 3.5 cm. wide, rounded to sharp points, margins with medium serrations. Described by Chas. Lemaire, Ill. Hort. 10 pl. 349. 1863. Catalogued by Wm. Bull, 1869.

BESSIE McARTHUR. Incomplete Double. Flower large, 10.5 cm. wide by 5.5 cm. high; color self neyron-rose 623; calyx large, dark green, shallowly cupped; petaloid sepals 3 with colored tips; outer petals large, 5 cm. long by 6 cm. wide, suborbicular,

margins slightly wrinkled, apices rounded to somewhat truncate, bases auricled; petaloids large, crinkled, irregularly shaped; stamens in fascicles, mixed among the petaloids; leaves large, 13 cm. by 7 cm., flat, dark glossy green, bases tapered, apices abruptly short pointed; plant compact, free flowering, a good garden variety. Introduced by G. G. Gerbing.

CANDIDISSIMA. Complete Double—Tiered. Flower medium, 8 cm. wide by 4 cm. high; color self white; calyx cupped, shallow, 4 cm. wide; sepals thin, small, roundish, 1.5 cm. by 1.5 cm., light to dark green with tan-colored margins; petaloid sepals 3 with greenish tips; petals 65 arranged in 6 tiers, oval to slightly obovate, outer ones 4 cm. long by 3.5 cm. wide, decreasing in size from flower edge to center, apices truncate or round, bases round or slightly tapered; leaves small, light green, apices tapered, bases tapered, margins with shallow serrations. An old variety, dating as far back as 1837 when L'Abbé Berlèse described it and gave Japan as its place of origin in his "Monographie du Genre Camellia." Introduced to Europe from Japan in 1830.

CATHERINE CATHCART. Complete Double—Imbricated. Flower medium, 8.5 cm. wide by 3.5 cm. high; color chromatic self carmine-rose 621/1 to almost white, veined with deeper lines; petals small, obovate, 4.5 cm. long by 4 cm. wide, decreasing in size toward center, margins entire, apices rounded, bases tapered; leaves 9 cm. long by 5 cm. wide, flat or slightly keeled, obovate-elliptic, apices abruptly sharp pointed, bases tapered, margins finely, shallowly serrated. A Magnolia Gardens introduction.

C. F. COATES. Single. Flower single, small, 5.5 cm. wide; color rose; stamens short, united in the lower half; ovary hairy; leaves green above, much lighter beneath, elliptic, main portion of blade 9 to 11 cm. long by 3.5 to 4 cm. wide, apices typically fishtail divided into 2 or 3 points, mostly 3, occasionally 1 only; points 2.5 to 3.5 cm. long (1 cm. in small leaves) each supplied with a well-defined branch of the main midrib, bases acuminate, margins finely serrulate. This camellia is a hybrid, *C. saluenensis* x *C. japonica* var. *quercifolia*, from a cross made by C. F. Coates in the Royal Botanic Gardens, Arboretum Nursery, Kew, England, October 1, 1935.

C. M. HOVEY. Complete Double—Imbricated. Flower medium to large, 8.5 cm. to 10.5 cm. wide by 2.5 cm. high, rather flat; color self carmine 21 and deeper, sometimes sparsely spotted and splashed with white; calyx cupped slightly, 4 cm. wide, some-

what rectangular; sepals cupped, light green without tan margins; petaloid sepals 6, silvery, bluntly triangular by recurving of margins; petals numerous, gradually becoming smaller from circumference of flower to center, inner ones spatulate to obovate and sometimes with erose tips; leaves ovate, large, to 12.5 cm. long by 5 cm. wide, dark green, bases tapered, apices ending in a long sharp point. Raised as a seedling by C. M. Hovey, Boston, Mass., first flowered in 1847, offered for sale in London in 1878. Variously known as Colonel Firey and William S. Hastie. The variegated form of Mathotiana, properly called Paulina (or Mathotiana Variegated) has been improperly carried under the above name.

COLLETTI. Incomplete Double. Flower medium, 8 cm. wide; color crimson 22 boldly variegated with white; calyx irregular, about 4 cm. wide, dark green, silvery green inside, without tan edgings; petaloid sepals 5, small; petals in 2 rows, self colored or variegated, apices notched, slightly folded; petaloids mixed large and small, somewhat folded; stamens occasionally present, central, sometimes hidden completely; leaves elliptic, 7.5 cm. long by 5 cm. wide, bases rounded, apices abruptly pointed, margins finely sharply serrated. Flowers of unusual color, a striking combination of crimson and white; plant grows slowly. Described by L'Abbé Berlèse in 1843.

CONTESSA LAVINIA MAGGI. Flower complete or incomplete imbricated depending upon stage of opening, medium size, 8.5 cm. wide by 4 cm. high; boldly variegated, striped and splashed carmine 21 to 21½ on a white or somewhat tinted ground; calyx large, light green; outer petals obovate, 4 cm. long by 3.5 cm. wide, margins entire, apices round, bases round or slightly tapered; central petaloids few, irregular in size, mostly small, 2.5 cm. long by 1.4 cm. wide, spatulate to obovate, apices round, bases tapered; stamens few or none, when present hidden, filaments short, curved, twisted, located in center of flowers; leaves large, broad in proportion to length, almost orbicular, 9 to 11 cm. long by 7 to 8.5 cm. wide, thick, leathery, dark green, curved, flat or slightly keeled, bases round or tapered slightly, apices blunt round or abruptly short, sharp pointed; margins coarsely serrate; a vigorous, free-flowering variety, one of the best in the striped color group. Originated in Italy by Conte Onofrio Maggi. In French literature the name usually is spelled Comtesse Lavinia Maggi, Comtesse being the French equivalent of the Italian Contessa. Illustrated in "Flore des Serres," Tome III, 2nd Ser. pl. 1525.59. 1858 and

"L'Illustration Horticole" pl. 331.9. 1862. This name has been improperly applied to several varieties.

COQUETTI. Complete Double—Imbricated. Flower medium, 9.5 cm. wide by 3.5 cm. high; color self turkey-red 721; calyx irregular in shape, green; petaloid sepals 5 with reddish markings; petals numerous, small to medium, 5.3 cm. long by 3.5 cm. wide, diminishing in size from margin to center, obovate, margins entire, apices round, bases tapered; leaves medium elliptic, 7 cm. long by 3.5 cm. wide, dark green, bases rounded, apices long acuminate, margins finely serrated. Originally an old Alabama plant. Introduced by Azalea Glen Nurseries under the name Glen 40.

COUNTESS OF ORKNEY. Complete Double—Imbricated. Flower medium to large, usually 9 to 10 cm. wide by 5 cm. high; color variegated, dull light pink ground striped and dotted neyron-rose 623; calyx flat; sepals thin, small, round, 1.5 cm. long by 1.6 cm. wide, green with membranous edges; petals ovate to round, 4.5 cm. by 4.2 cm. gradually becoming small from edge of flower to center, margins entire, bases slightly tapered, apices rounded, incurved toward flower center; leaves flat, dark green, oval, finely serrated. An old variety; of European origin. Described by Chas. Lemaire, "Flore des Serres," 4. pl. 349. 1848.

DAIKAGURA. Incomplete Double. Flower large, 10 cm. wide by 6 cm. high; color carmine-rose 621 to 621/1 blotched with white; calyx cupped, shallow, 3.8 cm. wide; sepals thin, shallowly cupped, orbicular, light green with tan margins; outer petals 12, large, 5 cm. long by 4.8 cm. wide, suborbicular, apices emarginate, bases round; petaloids both large and small, waved and ruffled with crimped margins; stamens numerous, central and also scattered in fascicles among the petaloids, filaments colored, curved and twisted; leaves oval, bases tapered, apices drawn out in long sharp points, margins coarsely serrated, serrations medium deep; early flowering. Introduced from Japan. A large number of colored variants have been derived from this variety.

DAITAIRIN. Single. Flower flat, large, to 12 cm.; color self carmine-rose 621/1, with darker veins; calyx large, cupped, light silvery green; petals 5, large, 6 cm. long by 8 cm. wide, suborbicular, margins entire, apices rounded, base curved to a large, broad haft; stamens numerous, flared, filaments faint pink toward base, light yellow above, 3.5 to 4 cm. long; styles 4, separated to base; a very large, single flower of striking appearance. Introduced from Japan.

DEBUTANTE. Complete Double—Irregular. Flower me-

dium, 8 cm. wide by 4 cm. high; color chromatic self carmine-rose shaded from 621/1 to 621/3; calyx flat, 4 cm. wide, irregularly shaped; sepals green with broad, broken tan margins; petaloid sepals 4; outer petals 12 in 2 rows, nearly orbicular, 3.5 by 3.5 cm. with short hafts; petaloids an irregular mixed mass, many of them large and folded; leaves oval, to 7.5 cm. long by 3.5 cm. wide, light green, apices and bases tapered, margins with coarse, sharp serrations. An excellent variety, originated as seedling in Magnolia Gardens near Charleston, S. C. Formerly known as Sara C. Hastie.

DONCKELARI. Semi-Double. Flower large, 10 cm. wide by 4 cm. high; color variegated, turkey-red 721 boldly marked with white, often splashed and waved; calyx flat, irregular; sepals tan colored, the inner ones thin, silvery; petaloid sepals 3, small; petals 14, obovate, 5 cm. long by 4.5 cm. wide, apices truncate or broadly, shallowly notched, bases round or slightly tapered; stamens 67 in central cylinder or sometimes fascicled, filaments pink tinted at bases, light yellow above, a few petaloids occasional; pistil normal, style pink; leaves elliptic, 10 cm. long by 5 cm. wide, dark green, abruptly sharp pointed, margins sharply, coarsely serrated. Introduced to Belgium from the Orient by Franz von Siebold in the early 1830's, named for Donckelaar, Chief Gardener of the Botanical Garden, Louvain, Belgium; described in "L'Horticulteur Belge" 2: 63. 1834. It was growing in the United States in the 1830's.

DUCHESS OF SUTHERLAND. Incomplete Double. Flower medium to large, 8.5 cm. and wider; color variegated, white marked sparsely with wide carmine stripes; calyx cupped, 4.5 cm. wide; sepals light tan margined, inner light green, outer ones green; petaloid sepals 3 or 4, green tipped; outer petals firmly attached to the receptacle, round, 5 by 5 cm., bases rounded to short stout hafts, apices truncate or round; petaloids creped, somewhat folded, irregularly shaped, fascicles of stamens intermixed; stamens scattered, filaments light yellow; pistil malformed; leaves narrowly elliptic, 9.5 to 10 cm. wide by 4 to 4.5 cm. wide, margins with medium sharp serrations. A Magnolia Gardens variety.

ELEANOR HAGOOD. Complete Double—Imbricated. Flower medium, 8 cm. wide by 3.5 cm. high; color chromatic self carmine-rose 621/1 to 621/3 (almost white), lighter in center than around circumference; calyx light green with narrow tan line on margins of sepals; petals with margins slightly incurved, orbicular, 3.5 cm. long by 4 cm. wide, margins smooth, entire apices emarginate, bases rounded to short hafts; leaves elliptic, 9.5 cm. long by 5 cm.

wide, dark green, bases rounded, apices abruptly short acuminate, margins finely, sharply serrated. A Magnolia Gardens introduction.

ELEANOR OF FAIROAKS. Incomplete Double. Flower large to very large, 13 cm. wide by 6 cm. high; color self blood-red or variegated splashed white; calyx large; petals 10 in 2 rows, thick, large, 6.5 cm. long by 5.5 cm. wide, obovate to round, margins smooth, entire, apices emarginate with notches medium deep, bases tapered to a stout haft; petaloids mostly large, obovate or spatulate; stamens fascicled mixed with petaloids and mostly hidden, filaments colored at bases for one-fourth to one-half length, yellow above; leaves elliptic, 11 cm. long by 5.5 cm. wide, curved, twisted, dark green, finely serrate. A nameless variety at Mount Hermon, La., from Good & Reese, who imported it from Italy many years ago, probably 1906. First catalogued by Bolen, 1943.

ELEGANS. Incomplete Double. Flower large, to 10 cm. or more wide by 4.5 cm. high; calyx cupped, 5 to 5.5 cm. wide; sepals with narrow tan margins, inner ones thin, silvery, membranous, outer one green; petaloid sepals 4; outer petals round, 5 cm. long by 5 cm. wide in 3 rows, self colored carmine 21 or variegated with white, bases crimped to a short, narrow haft, central petaloids variegated or self with stamens intermixed, some flowers are double irregular with stamens present but hidden; pistil malformed; leaves large, oval, mostly 8 to 9 cm. by 3.5 to 5 cm. wide but up to 10 cm. by 5.5 cm. wide, curved, keeled, glossy, dark green above, lighter beneath, apices tapered abruptly, bases tapered slightly, margins sharply serrated. A favorite variety, originated by Alfred Chandler, described by Chandler and Booth in 1831. Varies much in its color from self carmine to carmine with much white.

ELIZABETH BOARDMAN. Incomplete Double. Flower large, to 12 cm. wide by 5 cm. high; color self white; calyx cupped, light green, tan margined; petals 5.5 cm. long by 5.5 cm. wide, orbicular, margins smooth, entire, apices rounded, bases rounded to a haft; petaloids flat or folded, creped; stamens white, 2.5 cm. long, fascicled, nearly hidden among petaloids; leaves elliptic, thick, large, 11 cm. long by 5.5 cm. wide, dark glossy green, bases tapered, apices tapered, margins serrated, shallow. A Magnolia Gardens seedling, catalogued 1942–43.

EUGENE LIZE. Incomplete Double. Flower large, to 12 cm. wide by 4 cm. high; color variegated chromatic self carmine 21/1 to 21/3 with irregular white splotches; calyx shallow, large, 5 cm. wide; outer sepals light tan, inner green, thin; petaloid sepals 5,

marked with light green and tan; petals 14, large, 6 cm. long by 5 cm. wide, obovate, margins smooth, apices shallowly emarginate, bases rounded to a short, thick haft; petaloids about 18, creped, waved, sometimes folded, obovate, usually lighter than the petals; stamens fascicled, mostly central, distributed among the petaloids to some extent; leaves obovate to oval, 9 cm. long by 4 cm. wide, apices acuminate, bases tapered, margins finely, sharply serrated. Said to be a seedling of Donckelari, imported from Europe.

FIMBRIATA. Complete Double—Imbricated. Flower self white, in size and shape a duplicate of Alba Plena except that the margins of the petals are fimbriated (finely cut to make a fringe). The leaves likewise are the same as those of Alba Plena. There is reason, therefore, to believe that it is a form of Alba Plena. In the churchyard of Grace Episcopal Church at St. Francisville, La., there is a large specimen of Fimbriata that at times produces flowers that are not fimbriated and are identical with those of Alba Plena. It was in England as early as 1816, but exactly when or by whom introduced is not known.

FINLANDIA. Semi-Double. Flower large, 10 to 11 cm. wide by 5 cm. high; color self white; calyx small, nearly flat, light green; petals large, 5 cm. long by 5.5 cm. wide, suborbicular, margins entire, apices deeply notched, creped, bases tapered slightly or round; petaloids present in some flowers, suberect, waved, folded; stamens numerous, sometimes mixed with fairly large petaloids, filaments white, 2.5 to 3 cm. long; leaves elliptic, 8 cm. long by 4 cm. wide, flat or slightly keeled, curved, dark green, bases tapered, apices acuminate to a short sharp point. It was to this variety that the name Finlandia first was applied. From the old Busch Garden, Pasadena, Calif., said to be a white sport from a variegated variety, propagated by Jannoch Nurseries. There are other color variants.

FRAU MINNA SEIDEL. Complete Double—Imbricated. Flower small to medium, 6.5 to 8 cm. wide by 3.5 cm. high, regularly imbricated, occasionally voluted; color carmine-rose 621/3 and lighter tinted; calyx small, 2.5 to 3 cm. wide, shallow; sepals thin, green; petals 57 to 63 with an added number of very small ones making up a small central cone, obovate, cupped, margins smooth, apices notched, bases tapered; leaves oval, small to medium, mostly 8.5 cm. long by 4 cm. wide, bases tapered, apices tapered, margins finely serrulate. It was catalogued in Japan in 1891 as Usu-otome. It was imported from Japan to Europe by T. J. Seidel, Dresden, Germany, and named and catalogued Frau Minna Seidel

in 1893, and under that name it was imported, but it is commonly called Pink Perfection in the United States.

FLAME. Semi-Double. Flower large, to 12.5 cm. wide; color turkey-red 721 with darker veining; calyx deeply cupped, 3 cm. wide; sepals 5, cupped, green with broken tan margins; petaloid sepals 4, small; petals 11 in 2 rows, obovate to round-obovate, elevated (not flat), large, 6 cm. long by 5 cm. wide, apices round or truncate, slightly folded; stamens 66, irregular in length to 4.5 cm., filaments carmine in the lower portion, pinkish yellow above, anthers deep yellow; pistil 3.5 cm. (shorter than the stamens), style light pink, ovary yellow; leaves oval, to 10 cm. long by 4.5 cm. wide, dark green, bases and apices tapered, margins finely serrated. Imported from Japan. Introduced by T. Domoto, Hayward, Calif., 1917.

FRED SANDER. Semi-Double. Flower medium to large, 10 cm. wide by 3 cm. high; color turkey-red 721, occasionally spotted white; calyx irregularly shaped, 3.5 cm. wide; sepals with narrow tan edges, inner ones silvery; petaloid sepals 3, marked with silvery hairs at tips; petals 15 in 4 rows, reniform, 4.5 to 5 cm. long by 5.5 to 6.5 cm. wide, waved, creped, laciniated, bases crimped to short, stout hafts, apices laciniated or notched; stamens 53, central 3 cm. long; leaves oval, 9.5 cm. long by 4.5 cm. wide, surfaces waved, tips drooping, margins with shallow, blunt serrations. Fred Sander is a sport of Tricolor introduced by Fred Sander & Son, of Bruges, Belgium, and England. Described and illustrated by Max Garnier, "Revue Horticole" 476, Oct. 16, 1913.

FRIZZLE WHITE. Incomplete Double. Flower large, 12 cm. wide by 3.5 cm. high; color self white; calyx thin, shallow, light green; sepals oblong, small, 2.5 cm. long by 1.5 cm. wide, green shading to silver-green with thin edges; petaloid sepals 3 with tips and central parts green; petals 6, large, 6 cm. long by 5 cm. wide, broadly obovate to round, apices round, wrinkled, bases rounded to short broad, thick hafts; petaloids 10, large, erect, variable in size, round to obovate, folded, curved, twisted, apices round; stamens numerous, spreading, many of them fascicled, filaments white, variable in length to 3.5 cm.; pistil normal; leaves thin, oval, to 9.5 cm. long by 4 cm. wide, dark green above, lighter beneath, bases tapered, apices sharp pointed, margins finely, sharply serrated. Grown from seed imported by K. Sawada from Japan in 1925.

GIGANTEA. Incomplete Double. Flower large to very large, 10 to 12.5 cm. wide by 4.5 cm. high; color variegated crimson 22, splotched, marbled and dotted white; calyx large, 4-sided, shallowly

cupped; sepals large, round, 3.5 by 3.5 cm., green, thin margined with very little tan edging; petaloid sepals 3, colored with silvery apical patches; petals 10 to 12, large, suborbicular, 5.5 cm. long by 6.5 cm. wide, thick, bases tapered slightly, apices rounded; petaloids small, variegated, surrounding and attached to stamen cylinder; stamens numerous, filaments stout, colored in lower parts, yellow above; pistil normal, 3-parted; leaves oval, 7.5 cm. by 4 cm., dark green, bases tapered, apices sharp pointed, margins finely serrated. Name used by L'Abbé Berlèse in "Monographie du Genre Camellia," 1837; catalogued by William Prince, 1844, but apparently name was used at that time for a different plant. Known also as Emperor Wilhelm and Magnolia King. Mary Bell Glennan is a light-colored sport, said to be hardy. There is a self red form.

GOSHOGURUMA. Semi-Double. Flower large, to 12 cm. wide by 4 cm. high; color variegated, carmine-rose 621 with purplish shading and scattered round white dots; calyx cupped, 4.5 cm. wide, green with tan edgings; petals in 2 rows and a portion of a third, thick, large, 5.5 cm. long by 4 cm. wide, obovate, margins entire, apices emarginate, bases auricled or tapered to narrow pointed hafts; stamens very numerous, all central, prominent in a wide flared group as much as 6 cm. wide, filaments curved, white or yellowish white, 2.5 to 3.3 cm. long; leaves elliptic, 7 cm. long by 4 cm. wide, curved, dark green, apices tapered (acuminate), bases tapered slightly, margins finely serrated. An introduction from Japan.

HAKU-RAKUTEN. Semi-Double. Flower medium to large, 9 to 10 cm. wide by 5 cm. high; color self white; calyx cupped; sepals thin, light yellowish green with tan edges; petals numerous, large, 5.5 cm. long by 4 cm. wide, obovate, apices emarginate (shallow), base tapered; innermost petaloids erect, folded; stamens numerous, all central surrounded by upright, folded petaloids, filaments pale yellowish white, irregular in length to 5.5 cm.; leaves large, oval, dark green, bases tapered, apices abruptly pointed, margins shallowly serrated. A good white variety, medium early. Imported by T. Domoto from Japan in 1929.

HAKU-TSURU. Incomplete Double. Flower medium to large, 9 cm. wide by 5 cm. high; color self white; calyx shallow, irregular; sepals medium, round, 1.2 cm. long by 1.5 cm. wide, light green with narrow, broken tan edges; petaloid sepals 4, marked with green at tips; petals 16, large rounded, 4.5 cm. long by 4 to 4.5 cm. wide, apices round, bases rounded to short broad hafts; petaloids 8, erect, 4 cm. long by 2 to 2.5 cm. wide, irregularly folded, margins some-

what erose, apices rounded, bases tapered; stamens numerous, central, erect, a few petaloids intermixed, filaments light yellow overtopped by petaloids; leaves large, to 11 cm. long by 5 cm. wide, dark green, bases tapered, apices acuminate, tips depressed. A fine white variety of excellent substance. Introduced from Japan.

HERME. Incomplete Double. Flower medium, 9 cm. wide by 4.5 cm. high; color variegated, carmine-rose 621/1 margined white with the central color feathered into the white margin, runs into several variegated color forms, also a self-colored carmine one; petals obovate, 4.5 cm. long by 4 cm. wide, somewhat twisted; stamens numerous, central, sometimes fascicled with petaloids intermixed, basal parts of filaments pink tinted, upper parts yellowish white; leaves oval, 9 by 4 cm. wide, apices and bases tapered. Brought from Japan to Dresden, Germany, by T. J. Seidel and named Herme, 1893. Known in Japan as Hikaru-genji; catalogued as Hikaru-genji in 1891 by Yokohama Nursery Company; named Souv. de Henri Guichard in France and Jordan's Pride on the Pacific Coast.

HISHI-KARAITO. Incomplete Double. Flower small to medium, 8 cm. wide by 4 cm. high; color tyrian-rose 24/2 with deeper colored veins, with center of white petaloids giving the effect of a bicolor flower; calyx narrow, deeply cupped, light green, pubescent on outer surface; petals 15 in 3 rows, small, 4 cm. long by 2.5 cm. wide, obovate, curved, margins entire, apices round with tiny notch, bases tapered; petaloids white, variable in shape, mostly strap shaped with serrated margins; stamens fascicled, mixed with the petaloids, filaments pink tinted; leaves glossy green, twisted, curved, stiff, narrowly elliptic, 8.5 cm. long by 3.5 cm. wide, apices acuminate, bases tapered, margins with fine sharp serrations. An interesting, free-flowering variety, introduced from Japan. Listed by Chugai in 1934–35 and by E. A. McIlhenny, 1937.

IMPERATOR (French). Complete Double—Irregular. Flower large, 10 cm. or more wide by 5 cm. high; color self turkey-red 721/3 to rose-madder 23; calyx round, shallowly cupped, 5 cm. wide, dark tan; sepals large, dull green with wide tan margins; petaloid sepals 3, with large silvery areas; petals in 2 rows, extending well beyond the central mass of the flower, large, nearly round, 5.5 cm. long by 5.5 cm. wide, bases round or tapered slightly, apices notched; petaloids folded, curved, spatulate; stamens few, shorter than and completely hidden among the petaloids; leaves large, dark glossy green, elliptic to obovate, bases tapered, apices

sharp pointed. This variety was imported from France in 1926. Not to be confused with an inferior camellia grown under same name in the United States.

IMURA. Semi-Double. Flower large, to 12 cm. wide; color self white; calyx cupped, green, 4 cm. wide; outer sepals green with narrow tan margins, inner thin, light green with wider tan edges; petaloid sepals 4, tipped green; petals 10, large, 6.5 cm. long by 4 cm. wide, obovate to oval, bases slightly tapered or round, apices rounded, entire or slightly notched; stamens 53 to 60, central, filaments white, anthers yellow; style normal; leaves lanceolate elliptic, 10 to 10.5 cm. long by 3.5 to 4 cm. wide, dark green above, lighter beneath, midrib prominent on underside, somewhat twisted, drooping, apices short acuminate, bases tapered, margins reflexed, shallowly serrulate. Produced from Japanese seed imported in 1925 by K. Sawada.

JARVIS RED. Incomplete Double. Flower medium to large, 9 to 10.5 cm. wide by 5 cm. high; color turkey-red 721 to 721/1; calyx deeply cupped, 4 cm. wide; sepals dark grayish green with tan margins, inner ones lighter; petaloid sepals 3, silver-green and red; petals 16, obovate, 6 cm. long by 4 cm. wide, thick, recurved, apices rounded, truncate or broadly notched, thick; stamens central with petaloids intermixed, filaments colored at their bases, yellow in upper parts; leaves oval to elliptic, dark glossy green, bases tapered, apices abruptly short pointed or acuminate, depressed. A nameless variety imported from Japan by T. Kiyono and planted on the Jarvis place, Semmes, Ala.

JESSICA. Semi-Double. Flower medium to large, to 10 cm. wide by 4 cm. high; color variegated with bold contrasted variegations, crimson 22 and white, with some petals self crimson 22; petals 16, obovate, medium to large, 6 to 6.5 cm. long by 5 cm. wide, apices round or slightly notched, bases tapered, margins entire, smooth; stamens central, numerous, pink at bases, yellow above; leaves 10 cm. long by 5 cm. wide, elliptic, curved, dark green, glossy, bases tapered slightly, apices curved, slender, acuminate, margins medium to coarsely serrated. Propagated from an old tree belonging to Mrs. Kite near Nichols, Ala.

JUBILEE. Complete Double—Irregular. Flower large, heavy, to 10 cm. wide by 5 cm. high; color self neyron-rose; calyx large, cupped; sepals green, inner ones paler, margins with little or no tan; petals 9, upright or incurved slightly, orbicular, 4 cm. long by 4.5 cm. wide, margins plain, apices emarginate, bases rounded;

center filled with small strap-shaped petaloids; stamens none; flower buds green, ovoid, pointed; leaves elliptic, dark green, 9 cm. long by 4.5 cm. wide, flat, curved, bases tapered, apices acuminate, sharp, margins finely serrated. Imported from Guichard Sœurs, Nantes, France; an unusual flower.

KENNY. Incomplete Double. Flower medium to large, 9.5 to 10.5 cm. wide by 5 cm. high; color variegated, white with carmine 21/1 and lighter markings; calyx 5 cm. wide, cupped, irregular; petals irregularly round, waved, 4.3 cm. long by 4.5 cm. wide, apices broadly, shallowly notched, bases rounded to short, thick hafts; petaloids about 11, large, 4.5 cm. long by 3 cm. wide, erect or nearly erect, curved, somewhat folded; stamens in fascicles, mostly central, mixed with petaloids, filaments curved, tinted below, 3.5 to 4.5 cm. long; pistil malformed; leaves broadly oval, 9.5 cm. long by 5.8 cm. wide, curved, dark green, bases slightly tapered or round, apices abruptly short pointed, veins depressed. Origin unknown; imported from Guichard Sœurs, Nantes, France.

KIMBERLEY. Single. Flower somewhat cupped, large, 10 cm. wide by 4.5 cm. high; color bright self turkey-red 721; calyx cupped, 3.5 cm. wide; sepals thin, concave, silvery; petaloid sepals tinted red; petals 5 or 6, obovate, thick, 4 cm. long by 3.8 cm. wide, unequal in size, apices notched, undulate, bases tapered or rounded, margins entire; stamens numerous, forming a thick central cylinder, filaments stout, self turkey-red, anthers deep yellow, showy; pistil red, 3.5 cm. long, 3-fid one-half length; leaves elliptic, 7.5 cm. long by 4.5 cm. wide, dark glossy green, bases tapered abruptly, apices short tapered, margins shallowly, finely serrated. An introduction from England of unknown origin; regarded as hardy.

K. SAWADA. Incomplete Double to Double Imbricated. Flower large, 10.5 cm. wide by 4.5 cm. high; color self white; calyx flat, 4.5 cm. wide, irregularly 5-pointed; sepals small, oval or round oval, inner ones with pointed tips, cupped, pale green; petaloid sepals 3, with pale green centers and tips; petals about 50, incurved, large, 5.5 cm. long by 4 cm. wide, diminishing in size from edge of flower to center, obovate, apices truncate or rounded, bases tapered; stamens few, on short slender filaments showing as flower ages; leaves oval, dark green, 9 cm. long by 4.3 cm. wide, bases tapered, apices ending in sharp slender points. Grown by K. Sawada from seed imported in 1925 from Japan.

KUMASAKA. Incomplete Double. Flower large, 10 cm. wide by 4 cm. high; color variegated self carmine 21/1 or self carmine

with white markings; calyx shallow, cupped, 4.5 cm. wide, somewhat square; outer sepals cupped, dull green with tan edges, inner ones silvery green, thin with light tan margins; petaloid sepals 4, with light carmine centers; outer petals in 2 rows, round, 5 cm. long by 5 cm. wide, bases tapered, apices broadly notched; petaloids irregular, somewhat folded, a few funnel shaped, with stamens in center; filaments curved and twisted; leaves dark green, curved, narrow, 8.5 cm. long by 4 to 4.3 cm. wide, bases tapered, apices acuminate, serrations prominent, sharp. A Japanese variety.

LADY CLARE. Semi-Double. Flower large, to 12 cm. wide by 4 cm. high; color near carmine-rose 621 with darker veins and tiny splashes of darker color; calyx medium cupped, 4 cm. wide; sepals thick, green, inner ones silvery with narrow tan edges; petaloid sepals 2; petals 15, large, 5 cm. long by 6 cm. wide, orbicular, apices broadly, shallowly notched, bases rounded to short, broad hafts, surfaces creped; stamens few, about 30 in central cylinder, small petaloids occasional, filaments pink below, yellow above, 4 cm. long; style pink, slender, normal; leaves glossy dark green, broadly oval, 9.8 cm. long by 5 cm. wide, bases tapered, apices with long sharp points, margins serrated coarsely. Brought to Guernsey from Japan in 1887 by Caledonia Nursery, and named Lady Clare. Quite recently it has been brought to the United States from Japan under the name Akashi-gata. There is a variegated form.

LADY HUMES BLUSH. Complete Double—Imbricated. Flower small to medium, 7 to 8 cm. wide by 4 cm. high; color white suffused with pale pink that shows a deeper shade down among the petals; calyx flat, 3.5 cm. wide; sepals thin, mostly tan colored; petals numerous, gradually reduced in size from circumference of flower to center, outer almost orbicular, inner ones obovate, apices rounded to small narrow notches, petals often folded inward giving a pointed appearance; leaves slightly obovate to elliptic, medium, 8 to 8.5 cm. long by 4 cm. wide, dark green, glossy, curved, flat, apices short, sharp pointed, bases tapered, margins finely serrate. Imported to Wormslebury, England, from China for Lady Amelia Hume in 1806 and given the Latin name Incarnata with the English names Buff and Lady Humes Blush; a very desirable variety.

LADY VANSITTART. Semi-Double. Flower medium to large, 10 cm. wide by 3.5 cm. high; color variable, carmine-rose 621 and lighter on a white ground striped, or self carmine-rose 621 with a few central white marks or all white; calyx shallow, somewhat rectangular, 3.5 cm. wide; outer sepals tan colored, inner light green

with silver edges; petaloid sepals 3; petals 16 in 3 rows, obovate to round, 4.5 by 4.5 cm., waved, bases abruptly tapered, apices undulate or crimped, slightly notched, bases thick, round or slightly tapered; stamens central, fascicled; leaves ovate to ovate-lanceolate, somewhat twisted, dark glossy green, 7.5 cm. long by 3.5 cm. wide, apices acuminate, bases tapered, margins finely serrated. This variety was imported from Japan in 1887 by Caledonia Nursery, Guernsey, and named Lady Vansittart. This name has been corrupted into Lady van Setti and Lady van Sitti.

LALLAROOK. Complete Double—Imbricated. Flower medium, 9 cm. wide by 3 cm. high; color chromatic self carmine 21 to 21/3 variable, sometimes marbled white; calyx large, irregular in outline, 3.5 cm. wide; sepals cupped, inner ones light green, little or no tan margins; petals obovate, outer 4.5 to 5 cm. long by 3.5 to 4 cm. wide, gradually diminishing in size to center, margins involute toward tips giving appearance of a pointed and frequently a hooked petal; leaves narrowly elliptic, almost lanceolate in some, 8 cm. long by 3 cm. wide, glossy dark green, bases and apices long pointed, very characteristic. Propagated under the name Laurel Leaf in the United States. Known in France as Lallarook.

LILA ROSA. Incomplete Double. Flower large, 10 cm. wide by 4.5 cm. high; color self neyron-rose 623 or darker; calyx cupped, shallow, 4 cm. wide, light green, pubescent; petals obovate, 5 cm. long by 4 cm. wide, extending beyond the central mass of petaloids, margins entire, apices emarginate, bases tapered; petaloids numerous, spatulate, 3 cm. long by 1.5 cm. wide, upright, apices rounded, bases tapered; stamens few, mixed with petaloids, not conspicuous; leaves elliptic, 9 cm. long by 4.5 cm. wide, dark glossy green, bases tapered, apices emarginate, margins finely serrate; early flowering. Seedling raised by Camellia Nurseries, Tallahassee, Fla.

LINDSAY NEILL. Incomplete Double. Flower medium to large, 7.5 to 10 cm. wide by 4 cm. high; color currant-red 821 to 821/2 with white splashes, sometimes with a good deal of white at center; calyx large; sepals green to silvery green with broad tan margins, orbicular, 2 by 2 cm.; petals 14 in 2 rows, large, 5 cm. long by 3.8 cm. wide, cuneate to obovate, margins entire, apices retuse or notched, bases tapered; petaloids erect with incurved tips, variable in size, mostly small, a few large, 4 to 4.5 cm. long, narrow spatulate to cuneate, curved, twisted, slightly laciniated, apices incurved, bases tapered; stamens all central, mixed with petaloids, 3.5 cm. long, filaments crooked and twisted, pink; leaves oval,



CAMELLIA JAPONICA « MME DE NANTES »

almost flat, curved, 7 cm. long by 4 cm. wide, dark glossy green; apices short pointed, bases slightly tapered, margins finely serrated. Introduced from England by Mr. Mott, Columbus, Ga., in the 1840's. Propagated and distributed locally by Lindsay Neill.

MADAME HAAS. Complete Double—Imbricated. Flower medium, 8.5 cm. wide by 3 cm. high; color self carmine 21/1 to 21/2; calyx shallow, triangular; outer sepals green, inner ones light yellowish green with membranous edges; petaloid sepals 5, marked with yellowish white; petals orbicular or suborbicular, 4.5 cm. long by 4 cm. wide, diminishing in size from edge of flower to center; inner petals obovate, margins incurved, sometimes with faint white line down centers; leaves oval, 9 cm. long by 5 cm. wide, glossy dark green, bases tapered, apices acuminate, depressed, margins medium coarsely serrated. An importation from Guichard Sœurs, Nantes, Frances.

MAGNOLIAEFLORA. Semi-Double. Flower medium, 9 cm. wide by 4 cm. high; color self white flushed pale carmine-rose; calyx shallow, triangular; sepals cupped, pale green with or without narrow tan edges; petaloid sepals 3 or 4, marked with pale green, margins curved; petals obovate, thick, 5 cm. long by 3.5 cm. wide, curved, elevated, bases tapered, apices round, sometimes shallowly emarginate; stamens few (17), fascicled; leaves small, oval, curved, bases round or tapered, apices abruptly short acuminate, margins with fine, sharp serrations. Origin unknown. First reference found indicates introduction to England from Italy. Imported from England by T. Kiyono.

MARGARET WALKER. Incomplete Double. Flower large, 11 cm. wide by 3.5 to 4 cm. high; color variegated, white marked sparingly with carmine 21/1; calyx triangular, dark green with broad tan edges; petaloid sepals 3; petals orbicular or suborbicular, 5 cm. long by 5 cm. wide, margins entire, apices emarginate, bases rounded, unequal; petaloids 4 to 6, small, central; stamens central, fascicled with petaloids intermixed, light yellow, short, 2.5 cm. long; leaves narrow elliptic-obovate, 8 cm. long by 4 cm. wide, curved, keeled, dark green, apices tapered, bases tapered, margins finely serrate. From the Tea Garden, Summerville, S. C.

MARTHA BRICE. Incomplete Double. Flower medium to large, 10 cm. wide by 4 cm. wide; color self carmine-rose 621/2 slightly deeper toward center; calyx shallow, light green, margined with narrow tan line; petaloid sepals 2 or 3, silver-green tipped; petals medium, 5 cm. long by 5 cm. wide, orbicular, waved, margins

entire, apices slightly notched, bases rounded to a short haft; petaloids erect, curved, somewhat twisted, creped, apices creped, bases rounded to a small short haft; stamens fascicled, mixed among petaloids, filaments 2.5 cm. long, white; leaves elliptic, 9.5 cm. long by 5 cm. wide, dark green, apices rounded with short sharp points or sometimes acuminate (tapered to a sharp point). Originated by Mrs. E. M. Brice, Quitman, Ga.

MATHOTIANA. Complete Double—Incomplete Imbricated. Flower large, 11 cm. wide by 5 cm. high; color self carmine 21/1, with distinct deeper colored veins and purpling along edges of petals, under some conditions quite purple; calyx shallow, cupped, 4.5 cm. wide; sepals green, inner ones lighter, margins thin, tan colored; petaloid sepals 4, with silvery central markings; petals about 20, opened, large, thick round to slightly obovate, apices notched, central petals forming a large unopened bud; leaves oval, large, 11 cm. long by 5.5 cm. wide, bases tapered, apices abruptly pointed, margins often reflexed, serrations medium size, sharp. Originated by M. Mathot, a Belgian nurseryman. Often incorrectly named Mathotiana Rubra.

MATSUKASA. Incomplete Double. Flower medium, 9 cm. wide by 5 cm. high; color variegated camellia-pink blotched with white; petals obovate, the 2 sides unequal, 4.5 cm. long by 2.5 cm. wide, curved, margins entire, apices round, bases tapered, elevated above and separated from one another; petaloids about 6, with stamens intermixed; stamens all central, white, curved, to 2.5 cm. long; leaves elliptic, dark glossy green, curved, slightly keeled, 9 cm. long by 5 cm. wide, bases tapered, apices acuminate to a very sharp point, serrations of margin medium. This variety is often referred to as a "pine-cone" variety because the petals are curved, separated and elevated above one another like an open pine cone. Imported from Japan. There is also a white variety of the same form, White Pine Cone, originated as a seedling and introduced by K. Sawada.

MENA LADNIER. Complete Double—Irregular. Flower large, to 11 cm. wide by 6 cm. high; color self turkey-red 721/2, sometimes washed white on basal parts of petals; calyx large, cupped; sepals large, rounded, light silvery green with thin tan margins; petaloid sepals 3; petals 17, suborbicular, large, 4.8 cm. long by 5.8 cm. wide, apices undulate, bases tapered, margins erose or somewhat shallowly notched; petaloids numerous, spatulate, often folded, narrow, 4.5 cm. long by 1.9 cm. wide; stamens few, hidden;

leaves large, glossy dark green, 9 cm. long by 4 cm. wide, oval, apices long acuminate, bases tapered, margins coarsely serrate. Originated by Mrs. Wilhelmina Ladnier, Pascagoula, Miss., and introduced by Overlook Nurseries. Duncan Bell is a synonym for this variety.

MERMAID. Semi-Double. Flower medium, to 10 cm. wide by 3.5 cm. high; color self carmine 21/1 with darker veins; calyx shallowly cupped, silvery; petals 14 in 2 rows and a partial third, medium, 5 to 5.5 cm. long by 4 to 4.5 cm. wide, margins smooth or somewhat waved, apices round, undulate, bases unequal, lobed to a short narrow haft; stamens numerous, erect, variable in length to 3.5 cm., basal portions pink; leaves glossy green, narrowly elliptic to 9 cm. long by 4 cm. wide, or lanceolate elliptic, bases tapered, apices variable, acuminate to a long tapered point or with 2 or 3 points, hence the common name Fishtail, margins finely, sharply serrate. Introduced in California; exact origin unknown. Camellias with foliage of this kind are commonly called Fishtail Camellias. Another variety introduced from Japan is Kingyo. In England it has been given the name Quercifolia. It has good foliage but the flower is inferior. The leaves of two others, raised from seed by R. J. Wilmot, Florida Agricultural Experiment Station, one of them white flowered, are described in the American Camellia Yearbook 1948. See C. F. Coates for a hybrid with same kind of leaves.

MIHATA. Single. Flower large, to 14 cm. wide; color self blood-red 820; calyx cupped, silvery with broad tan edgings; petals 6, waved, orbicular, 6 cm. long by 6 cm. wide; margins entire, apices creped, bases rounded to broad short hafts; stamens numerous with occasional flags intermixed, filaments pink, short, 2.5 cm. long with central cylinder deeply split, anthers very large; style pink, to 3.5 cm. long, united except for very short separation at tip. A Japanese variety introduced by E. A. McIlhenny. Catalogued 1937.

MONJISU. Semi-Double. Flower medium, 9.5 cm. wide by 4 cm. high; color self turkey-red 721/1 or variegated with white areas that shade into the red; calyx cupped, shallow, triangular, 3.5 cm. wide; outer sepals green, inner light silvery green with thin edges; petaloid sepals 3, with silvery areas; petals 16 in 3 rows, undulate, round obovate, 4.5 cm. long by 4.25 cm. wide, bases tapered, apices emarginate; stamens 79, central with a few petaloids occasionally, filaments red at bases, pink above; leaves oval, thin, 8 cm. long by 3.5 cm. wide, bases tapered, apices sharp pointed, margins finely serrated. An introduction from Japan.

MRS. CHARLES COBB. Incomplete Double. Flower large, 11 cm. wide by 6 cm. high, compact, with flower parts firmly fastened together; color self blood-red 820, sometimes almost black; calyx large, green, irregular; petaloid sepals 6, large; petals medium, orbicular, 5 cm. long by 5 cm. wide, margins smooth, reflexed, apices rounded, bases rounded to a short broad haft, or slightly lobed; petaloids filling the center of the flower, erect, recurved, variable in size, small in center; stamens shorter than the petaloids with which they are intermixed, filaments colored; leaves broadly oval, large, thick, 10 to 12 cm. long by 7 to 8.5 cm. wide, flat, curved, dark green, bases tapered, apices tapered or abruptly sharp pointed. A Magnolia Gardens variety.

MRS. K. SAWADA. Complete Double—Imbricated. Flower medium, 8 cm. wide by 3.5 cm. high; color white faintly flushed carmine 21/3; calyx cupped, light green, 3.5 cm. wide; sepals green with tan edges, inner silvery green with thin margins; petaloid sepals 3, small, marked with green; outer petals obovate, thick, apices rounded, shallowly notched, bases tapered, inner petals with incurved margins giving a pointed appearance; leaves oval, dark green, apices abruptly acuminate, margins finely serrate. A seedling variety raised by K. Sawada from seed imported from Japan in 1925.

NAGASAKI. Semi-Double. Flower large, 12 cm. wide by 4 cm. high; color variegated carmine 21/1, variable, moired, occasionally self colored; calyx large, cupped, dark green at center, silvery green outer parts; petals 12, large, 5.5 to 6 cm. long by 6.5 to 7.5 cm. wide, suborbicular, one or more sometimes folded, margins entire, slightly creped, apices truncate, waved; stamens numerous, central, filaments carmine at base, white above, 3.5 cm. long; leaves oval, 9 cm. long by 5 cm. wide, curved, flat, thick, dark green, bases round, apices abruptly pointed, margins medium coarsely serrate. Originated in Japan, imported to Guernsey in 1887 by Caledonia Nursery; the Japanese name was retained.

NOBILISSIMA. Incomplete Double. Flower medium, to 8.5 cm. wide by 3.5 cm. high; color self white; calyx deeply cupped, irregular in outline, 3 to 3.5 cm. wide; sepals green with narrow tan edges; petaloid sepals 2 or 3, with greenish markings; petals in 2 or 3 rows; petaloids variously shaped, folded and twisted, some spatulate; stamens fascicled mixed among the petaloids, filaments white, 3.5 cm. long; leaves elliptic, 9 cm. long by 5 cm. wide, bases tapered, apices acuminate, margins with sharp, medium serrations. Intro-

duced to Europe from Japan. It was listed by L'Abbé Berlèse in 1837. Some flowers could be classified as complete double irregular.

ORANDA-GASA. Single. Flower large, 10 cm. wide; color chromatic self carmine-rose 621/2 to 621/3, darker 621/3 at center of flower; petals 6, large, suborbicular, 4.5 to 5 cm. long by 5 to 5.5 cm. wide, creped, apices waved, truncate, bases auricled, margins entire; stamens flared, in some flowers replaced almost entirely by small petaloids (flags) white or flushed with carmine, filaments 2.5 to 3 cm. long, white; pistil perfect, 3-parted, green tipped; leaves small, dark glossy green, 7 cm. long by 4 cm. wide, ovate, bases rounded, apices acuminate (sharp pointed). Importation from Japan. Catalogued by E. A. McIlhenny, 1937.

PAEONIAEFLORA. Incomplete Double. Flower large, to 11 cm. wide by 5 cm. high; color variegated, largely white with carmine 21 markings; calyx large, somewhat triangular; sepals 5, outer ones tan colored, inner ones silvery green, thin; petaloid sepals 3, greenish tinted; petals large, rounded, 5 cm. long by 5.5 cm. wide, self white or white with large carmine areas; petaloids folded, waved, irregularly shaped; stamens fascicled, shorter than and mixed with the petaloids to form a central mass; leaves small, 6 cm. long by 3.5 cm. wide, oval, dark glossy green, bases tapered, apices tapered, margins finely serrate. An introduction from Europe of unknown origin and probably misnamed.

PEACH BLOSSOM. Incomplete Double. Flower medium, 9 cm. wide by 4 cm. high; color self carmine 21/3; petals 15 in 3 rows, obovate, 4.5 to 5 cm. long by 3 to 3.5 cm. wide, margins smooth, apices slightly emarginate, bases tapered; petaloids central; stamens fascicled, intermixed with petaloids, filaments yellowish white, 3.5 cm. long; leaves obovate, 9 cm. long by 4.5 to 5 cm. wide, dark green, bases tapered, apices abruptly sharp pointed. Imported from England. May be the same as the French Flore de Pecher.

PINK POPPY. Single. Flower small to medium, 7.5 cm. wide by 2.5 cm. high; color self carmine-rose 621/2 to 621/3, darker at center; calyx round, shallow, cupped, 3.5 cm. wide; sepals thin, light green with narrow tan edges; petaloid sepals 3; petals 8, reniform, 3 cm. long by 4 cm. wide, bases lobed on each side of a small, short haft, surface creped; stamens numerous, flared, forming a wide cup-like cylinder 3.5 cm. across, filaments light yellow, united in the lower third, elevated above the surrounding petals; pistil normal, stout; leaves oval, 7 cm. long by 4 cm. wide, light green,

bases tapered, apices tapered, margins finely serrate; a very attractive flower. A seedling introduced by G. G. Gerbing.

PINK STAR. Incomplete Double. Flower large, 10.5 cm. wide by 5.5 cm. high; color chromatic self carmine-rose 621 shading to lighter color, 621/2, toward center; calyx large, irregular in outline; sepals irregularly shaped, green with tan margins, 2.5 cm. wide; petaloid sepals 3 or 4, with light greenish centers; petals 13, orbicular, 5.5 cm. long by 5 cm. wide, margins entire, apices shallowly notched, bases rounded to a short broad haft; petaloids numerous, small, 4.5 cm. long, upright, irregular, twisted, notched; stamens fascicled, upright, filaments irregular in length to 3.5 cm., white, overtopped by upright petaloids; leaves oval, 9 cm. long by 5 cm. high, dark green, flat, tips depressed, bases tapered slightly, apices abruptly sharp pointed, margins finely serrate. Origin unknown, probably Japan. Catalogued by T. Domoto, 1935.

PRESTON ROSE. Complete Double—Irregular. Flower medium, 8 cm. long by 3.5 cm wide, color self carmine 21/1 (variegated blossoms have been reported); calyx large, composed of cupped, light green inner sepals, outer ones green with tan margins; petals medium size, 3.5 cm. long by 3.2 cm. wide, color carmine 21/1, almost orbicular, margins entire, bases round, apices round; petaloids irregular in shape and size, some elevated above the others; stamens few, short, hidden among petaloids; leaves dark green, large, 9 to 9.5 cm. long by 6 cm. wide, elliptic to nearly orbicular, bases round, apices short acuminate; very free flowering and showy. This variety, though distinct from Debutante, resembles it. Midseason. Listed by E. A. McIlhenny in 1935; appears to be a European variety.

PRIMA DONNA. Incomplete Double. Flower medium to large, 9 to 10 cm. wide by 4.5 cm. high; color variegated, carmine 21/1 with white blotches and areas washed with white; calyx irregular in outline, dark green; petaloid sepals 3, central tips silver; petals large, orbicular, 4.8 cm. long by 5 to 5.5 cm. wide, margins entire, apices rounded with small notches, bases rounded to short pointed hafts; petaloids few, creped, folded; stamens numerous, central, fascicled with a few petaloids intermixed, upright; leaves oval, 7.3 cm. long by 3.8 cm. wide, curved, flat, dark glossy green, bases tapered slightly, apices tapered to a blunt tip, margins shallowly crenulate. A fine Tea Garden variety introduced by Magnolia Gardens.

PROF. C. S. SARGENT. Complete Double—Irregular. Flower medium to large, 8 to 10 cm. wide by 5 cm. high; color self turkey-red 721, first flowers to open each season are lighter in color; calyx slightly cupped, dark tan; sepals small, thin, dark tan; petaloid sepals 4; petals 12 in 2 rows, recurved and somewhat folded, projecting but little beyond the central flower mass; petaloids numerous, closely packed together, completely filling center of flower, spatulate, somewhat folded; stamens a few central, completely hidden among the petaloids; leaves dark green, broadly oval, bases round or slightly tapered, apices abruptly acuminate; growth habit upright. It was named by the Rev. John G. Drayton for Prof. Charles Sprague Sargent, Director of the Arnold Arboretum for many years. Origin unknown, but undoubtedly an introduction by Fruitland Nurseries.

QUEEN BESSIE. Incomplete Double. Flower medium, 8 cm. wide by 4 cm. high; color self white faintly flushed carmine-rose 621/3; calyx silvery with thin, light tan margins; petals 17, medium, 5 cm. long by 4 cm. high, obovate, apices emarginate, bases unequal, slightly lobed on one side of short, thick, triangular hafts; petaloids few, central, erect; stamens numerous, curved, fascicled, with a few petaloids intermixed, filaments white; leaves elliptic, curved, with tip depressed, 10 cm. long by 6 cm. wide, dark green, apices short, abruptly pointed, bases tapered, margins shallowly, finely serrated. A K. Sawada seedling from imported Japanese seed planted in 1925.

REVEREND JOHN BENNETT. Semi-Double. Flower large, to 11 cm. wide by 5 cm. high; color self neyron-rose 623 in outer parts, veined darker, a few central petals faintly washed with white; calyx cupped, 4.5 cm. wide; sepals green, inner ones lighter, with thin edges; petaloid sepals 3, small, with silvered tips; petals 13 in 2 rows, large, reflexed, obovate, 6.5 cm. long by 5 cm. wide, bases tapered, apices round or truncate with very narrow notches; stamens about 60, central fascicled, filaments incurved, white above, tinted below, 4 cm. long; pistil normal, 3-fid; leaves oval, 9.5 cm. long by 4.5 cm. wide, bases tapered, apices tapered to blunt points, curved, margins serrate, coarse, shallow, blunt. A Magnolia Gardens variety.

REVEREND JOHN G. DRAYTON. Incomplete Double. Flower medium, 9 cm. wide by 4 cm. high; color self carmine-rose 621; calyx cupped, 3 cm. wide; outer sepals green, inner ones silvery green with broad tan edges; petaloid sepals 4; petals obovate, apices emarginate, bases tapered; petaloids large, erect, folded; stamens shorter, fascicled, mixed with petaloids, occasionally a few petaloids

are variegated with white; pistil malformed; leaves oval, 10.5 cm. long by 4 cm. wide, apices abruptly tapered, bases tapered, margins finely serrate. A Magnolia Gardens variety named for the Reverend John G. Drayton, who developed the garden beginning in the 1840's.

SHIRA-GIKU. Complete Double—Imbricated. Flower medium, 9 cm. wide by 3.5 cm. high; color self white; calyx light green, 3.5 cm. wide; sepals small, inner ones light green, outer darker green, all with light tan margins; petaloid sepals 3, marked with green; petals obovate, 4 cm. long by 3.2 cm. wide, diminishing in size to flower center, undulate or waved, bases tapered, apices emarginate with small notches; leaves oval, 9 cm. long by 4.5 cm. wide, bases tapered slightly, apices abruptly sharp pointed, margins sharply finely serrated. Commonly known in the United States as Purity, but the name Shira-giku was published in English at an earlier date. Introduced from Japan by T. Domoto, 1887; catalogued 1897.

SHU-BENI-HITOE. Single. Flower very large, more or less cupped, irregular triangular to quadrangular in outline, 14 cm. wide by 5 cm. high; color turkey-red and darker; calyx large, deeply cupped; petals 5, large, 6.5 cm. long by 6.5 to 7 cm. wide, margins waved, apices folded slightly, emarginate, bases truncate or rounded to a broad thick haft, 1 cm. long; stamens numerous, flared, filaments colored at base, lighter above, in some flowers the stamens are partially or almost wholly converted to flags, white with red stripes, incurved; leaves large, 9 cm. long by 6 cm. wide, ovate to ovate orbicular, flat, curved near tips, dark green, bases rounded, apices abruptly pointed, margins coarsely serrate. Imported from Japan by Kiyono Nurseries in 1940 and perhaps by others.

SMILING BEAUTY. Semi-Double. Flower medium to large, 11 cm. wide by 3.5 cm. high; color self carmine-rose 621/3; petals 20 in 3 to 4 rows, medium, 5.5 cm. long by 4 cm. wide, obovate, margins entire, apices rounded, bases tapered; stamens few, twisted, filaments light yellow, variable in length; leaves obovate, small, flat, curved, 8.5 cm. long by 4 cm. wide, dark green, bases round, apices acuminate, margins finely serrate. Originated from seed imported from Japan in 1925 and introduced by K. Sawada.

SNOWDRIFT. Semi-Double. Flower medium, 9 cm. wide by 4 cm. high; color self white; calyx small, irregular, 3 cm. wide; sepals light green, inner ones thin; petaloid sepals 5, with greenish markings, with narrow broken tan edges; petals in 3 rows, quite uniform in size, 4.5 cm. long by 3 cm. wide, obovate, bases tapered,

apices rounded or shallowly notched; stamens 73, united in cylinder or fascicled; filaments white, 3 cm. long; pistil malformed; leaves oval, thin, waved, 7 cm. long by 3.5 cm. wide, bases tapered, apices acuminate, margins sharply serrated. An introduction from Japan listed by T. Domoto in 1932.

ST. ANDRE. Incomplete Double. Flower large, heavy, 11.5 cm. wide by 6.5 cm. high; color self blood-red 820; calyx large, triangular, slightly cupped; sepals silvery, broadly marked with tan edges; petals 15 in 3 rows, 5.5 to 6.5 cm. long by 6 cm. wide, orbicular, margins entire, apices truncate, somewhat waved, bases tapered; petaloids erect, curved; stamens numerous, intermixed with and shorter than petaloids, filaments colored; leaves elliptic to orbicular, 8 cm. long by 5 cm. wide, curved, keeled, dark glossy green, bases round, apices short sharp pointed. Probably an old European variety renamed. Catalogued by E. A. McIlhenny in 1937.

SUIBIJIN. Single. Flower medium, cupped, 8 cm. wide by 3 cm. high; color carmine-rose 621/3 and lighter; calyx cupped, green, with narrow tan edges; petals 5, medium to large, 5 cm. long by 6.5 cm. wide, suborbicular, margins wrinkled, surfaces creped, apices slightly notched, bases rounded to a short thick haft; stamens numerous, flared, filaments yellow, 2 cm. long; pistil slightly longer than stamens, 3-fid, green tipped; leaves thick, curved, slightly keeled, oval, dark green, bases round, apices bluntly tapered, surfaces bullate, margins recurved. Introduced from Japan.

TRICOLOR. Semi-Double. Flower medium to large, to 10 cm. wide; color variegated, white suffused with neyron-rose 623/2, sometimes almost white striped and splashed with neyron-rose 623; calyx cupped, green, 3 cm. wide; sepals cupped, round, thin, green to silvery green with broken tan margins; petals 14, medium to large, 3.5 to 5 cm. long by 4 to 5.5 cm. wide, suborbicular to reniform, bases rounded to short stout hafts, apices undulate, margins entire; stamens about 60, filaments 3.5 cm. long, white above, colored below; pistil normal; leaves dark glossy green, 10 to 10.5 cm. long by 3 to 4.5 cm. wide, narrowly oval, flat, curved, bases tapered, apices tapered to a blunt point, tips depressed, margins depressed midway on sides, serrations coarse. Tricolor was introduced from the Orient to Belgium by Dr. Franz von Siebold in 1834. Its color is variable and three variants have been named, Leucantha (white), Waka-no-ura (rose), Lady de Saumerez (red). The last of these three was selected and named by Caledonia Nursery, Guernsey.

VILLE DE NANTES. Semi-Double. Flower large, to 12 cm. wide; color variegated, boldly marked with white and turkey-red 721; calyx cupped, 4.5 cm. wide; sepals thin, round, outer ones with tan margins, inner ones silvery green; petaloid sepals 3; petals orbicular, 5.5 cm. long by 5.5 cm. wide, bases tapered slightly, apices round, irregular, reflexed, color variable, some self turkey-red 721, others variegated with much white, inner petals 4 or 5, erect or semi-erect, folded, creped; stamens 85, central, the cylinder largest at base, tapered upward, ridged, filaments colored in lower portion, yellow above; leaves oval, 9 cm. long by 4.5 cm. wide, shallowly, bluntly serrated. A Huertin introduction, Nantes, France, 1910. Sport of Donckelari.

VIRGINS BLUSH. Incomplete Double. Flower large, 11 cm. wide by 5 cm. high; color self carmine-rose 621/3; calyx irregular, light green slightly margined tan; petals medium, 5.5 by 3.7 cm., obovate, slightly recurved, margins somewhat irregular, apices rounded, bases tapered; petaloids small, central curved; stamens central with a few petaloids intermixed and a few flags, filaments white, 3 cm. long; leaves elliptic, 9 cm. long by 3.5 cm. wide, dark green, bases tapered, apices acuminate, margins medium serrate. An E. A. McIlhenny variety, catalogued in 1946.

WHITE EMPRESS. Semi-Double to Incomplete Double. Flower large, to 11 cm. wide by 6 cm. high; color self white with yellowish tint in center at bottom of petals; calyx cupped, irregular, large, 5 cm. wide; sepals large, 2.8 cm. long by 2 cm. wide, outer ones dark green, inner ones light green with thin membranous margins; petals 16, large, 5 to 6 cm. long by 4.5 to 5.5 cm. wide, orbicular, margins smooth, apices emarginate with broad, shallow notches, bases round or slightly tapered to a thick, broad, creased haft; petaloids 6, medium, 5 cm. long by 4 cm. wide, flat, irregularly shaped, apices rounded or truncate, bases tapered, crinkled; stamens numerous, fascicled in a central mass, light yellow, 4 to 5 cm. long, usually with a few (1 to 3) petaloids intermixed. A vigorous, free-flowering variety raised from Japanese seed, imported in 1931 by K. Sawada.

WOODVILLE RED. Complete Double—Irregular. Flower large, 10 cm. wide by 7 cm. high; color self neyron-rose 623; calyx large, 6 cm. wide, flat, light green, tan margined; petals large, 5 cm. long by 4.25 cm. wide, almost round, apices emarginate, bases tapered to a broad haft; petaloids numerous, large, 5 cm. long by 3.25 cm. wide, ovate, apices round emarginate, bases tapered;

leaves ovate, slightly twisted, 7 to 7.5 cm. long by 3.5 to 7 cm. wide, glossy green, apices abruptly sharp pointed, bases tapered, margins with serrations of variable sizes. There are several old specimens of this variety in the South. The one in Mississippi is located on the plantation of Mrs. Tom White about three miles south of Woodville. Another in Louisiana, where it has been called Henry Bry, is at Monroe on the property of Robert Layton. It has been known as Kollock and Robert Martin. Both the Woodville and the Monroe specimens are believed to have come from Europe and to have been planted in 1822 and about 1820. At that time varieties of camellias were not numerous in Europe. Woodville Red appears to be the oldest name published and used generally in the United States.

6

SASANQUA VARIETIES

VARIETIES derived from the species *C. Sasanqua* make up the second largest group of camellias grown in the United States. Upwards of one hundred varieties are in cultivation in American nurseries and gardens, and although greatly surpassed in numbers by the Japonicas, they nonetheless comprise a very important item among camellias. Their habit of flowering early in the season, their blooming while young, the beauty and abundance of their blossoms and their fine, glossy, closely spaced foliage place them in the first rank among good evergreen shrubs for garden uses. In spite of their distinct merits, they have not received the recognition to which they are entitled. Definitely their early blooming habit has militated against them. They are seldom or never placed on exhibition because camellia shows are held after their flowering season, which ends in December, has passed. Hence they really are unknown to many garden makers. However, they are gaining slowly in popularity as they become more widely planted and better known. For many garden purposes they are unsurpassed.

Sasanquas bloom early

Over a long period of time, Sasanqua varieties have received a larger share of attention in Japan than has been given to other camellia groups, and it is from Japan that the greater number of varieties now grown in America have been secured, either as plants or as seeds. Those grown from imported seed make up the second largest group; only a very few sorts have been obtained from American-grown seed.

Chief among those who imported Sasanqua plants was E. A. McIlhenny, who brought in from Japan a

great many varieties. Doty & Doerner, Toichi Domoto and T. Kiyono also have contributed to the total, while through the introduction of seeds from good sources and the raising of seedlings, K. Sawada and Coolidge Rare Plant Gardens have added several fine ones. To these men, for the most part, American gardens owe the many varieties now available, but there still remain in Japan a large number as yet unknown in the United States, some of which may extend the flowering time of the group into a much later season. A considerable number have been listed in Japanese catalogues as winter flowering.

Importers of Sasanqua plants

While flowering is influenced by climatic conditions and the time of blooming varies somewhat from year to year, Sasanqua varieties, as now known in America, are early blooming. Along the coast country of the Gulf of Mexico and in the Southeast generally, they begin to open their buds in September, occasionally even in August, and they finish in December. This also is their flowering time in California. In sections farther north their season is somewhat later. During the autumn, flowers are scarce in many gardens, and since Sasanqua camellias bloom during this period they are all the more desirable. In those regions where they are grown they have no rivals except for a few varieties of Japonica.

Although Sasanqua varieties have not been tested widely in colder parts of the camellia zone or outside its indefinite limits, indications are that they can be grown in all sections to which the Japonica varieties have been found to be adapted, and that in warmer parts of the camellia areas they will form flower buds more freely and bloom better than most of the Japonicas. It will probably be found also that some varieties are more winter resistant than others. Since

Regional adaptation of Sasanqua varieties

they are through blooming by or in December in most parts of the camellia region, their flowers usually escape frost injury and the full value of their blooms is realized. In some sections there are varieties that produce flowers over a period of nearly three months. For some areas the best camellias are those that bloom early or late, because the most severe weather comes in midseason and those that normally bloom then lose their flowers and often their buds. In such localities Sasanquas should be tried. For colder regions the planting and training of camellias against garden walls or the walls of houses and other buildings may well be considered.

Flower forms of Sasanqua varieties follow much the same patterns as are found among those of the Japonica group. There are single, semi-double, incomplete double and double-flowered varieties. Double imbricated forms are, for the most part, absent among varieties grown in America and by far the majority are single. No flowers surpass the beauty of single Sasanqua blooms in the simple arrangement of petals and stamens, and the beautiful shading of colors is not matched elsewhere. All of them are scented—indeed, it is not too much to say that they can be identified as to species by their scent alone, which at a distance is pleasing. Color in the flowers of Sasanqua varieties covers a range from self white to red, but red always or nearly always has a tint of purple in it. Many are beautifully flushed or shaded purplish toward the edges of the petals, a kind of variegation not common among Japonicas. They are matched in the delicate beauty of these tints by no other camellias.

Forms and colors of *C. Sasanqua*

In growth habit they vary greatly. A few are dwarf or nearly dwarf, as Autumn Beauty and Shishigashira, while others are vigorous growers. Rosea and Splendor are examples. There are varieties of narrow upright

growth like Texas Star and Brilliancy; there are spreading, open growers, as Mine-no-yuki and Hinode-gumo, and dense compact varieties, such as Papaver and Willow Leaf. Texas Star is unusual for its strict upright habit, Willow Leaf for its narrow pointed leaves, Hinode-gumo for the size and beauty of its flowers, Shishigashira for its dwarf habit, free flowering, and doubleness, Hiodoshi for the unusual color of its flowers, Hebe for its odd petals and Gulf Glory for its large, pure white blooms. Their varied growth forms add greatly to the beauty and interest of gardens wherever they are used.

Sasanqua varieties may be grown in both sun and shade. They appear to bloom more abundantly when planted where they receive a goodly measure of sunlight, particularly from noonday to sunset. Their foliage is very resistant to the ill effects of alternating frost and strong sunlight in winter. In this particular they are not surpassed by any other group of camellias.

ASAHI-GAI (Japan). Flower single, occasionally somewhat doubled, medium, 7.5 to 8 cm. expanded; color self solferino-purple 26/1; petals 8 or 9, overlapping, orbicular, 4 cm. long by 4 cm. wide, apices round, bases tapered slightly, surface smooth except for creping along margins; stamens prominent, spreading, up to 2 cm. long, filaments light yellow, anthers golden; leaves dark green, elliptic, 7 cm. long by 3 cm. wide, apices tapered to a blunt point, bases tapered, margins coarsely crenulate.

AUBURN (Dodd). Flower single, medium to large, 7 to 8 cm. expanded; color magenta 27 to 27/1 with light-colored center; petals medium, 3.5 cm. long by 4 cm. wide, magenta 27 to 27/1, light colored at base, apices round or truncate, bases round, margins entire; leaves small, elliptic, 5.5 to 6 cm. long by 3 to 3.5 cm. wide, flat, dark green, apices depressed abruptly, tapered to a blunt point, bases round, margins coarsely crenulate. Seedling raised by Tom Dodd, Semmes, Ala.

BRIAR ROSE (Coolidge). Flower single, medium to large, 7 to 8.5 cm. expanded; color chromatic self solferino-purple 26/2

to 26/3, somewhat lighter toward the center; petals 7, medium to large, almost rectangular, 4 cm. long by 2.5 cm. wide, apices truncate, emarginate, bases tapered; leaves elliptic, 4 to 4.5 cm. long by 2.5 to 3 cm. wide, apices tapered to a blunt point, bases round. The leaves are closely spaced on the twigs, resulting in a densely foliaged head.

CLEOPATRA (Japan). Flower semi-double, sometimes with a double center, small to medium, 6 to 7.5 cm. expanded; color chromatic self rose-bengal 25/1 to 25/3, the center lighter; petals 12 to 15, suborbicular, small, 3 cm. long by 3 cm. wide, apices truncate, bases rounded to a small short haft; stamens numerous, short, straw-yellow; leaves small, rather thin, elliptic, 4.5 cm. long by 2.25 cm. wide, dark green, apices blunt, bases tapered, margins finely crenulate; shrub vigorous, compact. Introduced in 1929 under an incorrect name and named Cleopatra by K. Sawada. Strong growing, free flowering.

DAINTY BESS (Japan). Flower single, small, 5 cm. expanded, cupped; color self tyrian-rose 24/3 (light rose colored), somewhat lighter in the outer parts; petals 8, small, round, 2.5 cm. long by 2.5 cm. wide, apices slightly creped, bases somewhat tapered; stamens lemon-yellow; pistil green, longer than the stamens; leaves elliptic, 5 cm. long by 2.2 cm. wide, dark green, nearly flat, apices blunt, depressed, bases tapered abruptly, margins slightly crenulate (almost entire), petiole short, flat; shrub compact, low growing, suited for planting in limited space.

GULF GLORY (Sawada). Flower showy, single, large, 9.5 cm. expanded; color self white; petals 7, partly overlapping, large obovate or irregularly orbicular, 5 cm. long by 4 cm. wide, apices emarginate with broad shallow notch, bases tapered, margins entire, creped; stamens light yellow, 2 cm. long, widely spread; flower buds ovoid, green with narrow tan margins on sepals and scales; leaves obovate to obovate-elliptic, 5 to 6 cm. long by 2.5 to 3 cm. wide, slightly keeled, curved, dark glossy green, midrib prominent on upper surface; shrub broadly upright, compact. This variety formerly was named Grandiflora Alba, but to avoid confusion with another variety the name was changed to Gulf Glory.

HANA-YUKI (Japan). Flower single, cupped, 5 to 6 cm. or larger expanded; color self white; petals 8 to 10, obovate, 3.25 cm. long by 2.5 cm. wide, margins somewhat eroded, apices emarginate with a relatively broad shallow notch, bases tapered; stamens showy, flared, golden; leaves elliptic, 5 cm. long by 2.5 cm. wide,



thick, curved, keeled, dark glossy green, apices blunt, bases slightly tapered, margins coarsely crenulate, petiole short; shrub spreading broader than high, low growing. This is a fine single white with petals of good substance and attractive foliage.

HEBE (Coolidge). Flower single, large, 9 cm. expanded; color self solferino-purple 26/1; petals 7, widely separated, unusual in shape by the folding backward of the margins for about half their length from their bases, actually obovate when flattened, 4 cm. long by 3 cm. wide, apices truncate, emarginate with narrow notch, bases tapered; stamens semi-erect, in compact bunch of medium length; leaves elliptic, 5 cm. long by 3 cm. wide, slightly keeled, not curved, apices rounded to a blunt tip, bases round or slightly tapered, margins crenulate; shrub densely branched, well covered by foliage to form a glossy dark green mass. An interesting variety because of its peculiar petals and free-flowering habits. Grown from seed imported from Japan by Coolidge Rare Plant Gardens.

HINODE-GUMO (Japan). Flower single to semi-double, large, 10 cm. expanded; color white at center, flushed and margined with rose-bengal 25/2 to 25/3 around the edges; petals 10, of goodly substance, mostly flat with a few (2 or 3) somewhat erect in the center, large, orbicular or suborbicular, 4.5 cm. long by 4.5 cm. wide, apices truncate, wrinkled, bases round, wrinkled, margins creped; stamens 2 cm. long, lemon-yellow with golden anthers; leaves narrow, elliptic, 6.5 to 7.5 cm. long, curved, slightly keeled, dark glossy green, apices blunt, bases tapered, margins coarsely crenulate; shrub vasiform, rather openly branched. This variety is one of the finest of the Sasanqua group. The flowers are large, beautifully shaded or flushed at the edges and of good substance.

HINODE-NO-YUKI (Japan). Flower single, small to medium, 7.5 cm. expanded; color self magenta 27/1; petals 7, suborbicular, 4 cm. long by 4.5 cm. wide, apices truncate, bases round, margins creped toward the apices; leaves elliptic, 5 cm. long by 2.5 cm. wide, thick, curved, almost flat, glossy dark green, apices depressed, blunt, bases round or slightly tapered, margins coarsely crenulate.

HIODOSHI (Japan). Flower single, medium to large, 7 to 8.5 cm. expanded, opening flat; color variable, self magenta 26/1 or moire of same color on white ground; petals 8, medium, obovate to suborbicular, 3.5 cm. long by 3 cm. wide, apices emarginate with a broad notch of medium depth, bases tapered, margins smooth or waved; stamens light yellow, widely spread, 1.75 cm. long; leaves elliptic-obovate, 5.5 to 6 cm. long by 1.5 to 2.5 cm. wide, thick,

curved, keeled, dark glossy green, apices tapered to a medium point, bases tapered, margins with medium coarse crenulations. Flowers occur that are self colored; others may have some petals self colored and the others moire, or all may be moire. Blotches of white or pinkish white are also found in some flowers. Interesting because of its color, which is uncommon among varieties of this group now growing in the United States.

LAVENDER QUEEN (Sawada). Flower single, large, 8.5 to 9 cm. expanded; color solferino-purple 26 to 26/2; petals 8 or 9, large, obovate, 4 to 5 cm. long by 3.5 to 4.5 cm. wide, apices emarginate with deep notch, bases tapered, surface slightly creped, margins entire; stamens medium length, 1.5 to 2 cm., widely flared; leaves coriaceous, elliptic, 5 cm. long by 2.5 cm. wide, glossy dark green, apices depressed, abruptly short, sharp pointed, bases tapered, margins finely crenulate.

MINE-NO-YUKI (Japan). Flower semi-double to incomplete double with laciniated, twisted, folded, erect or partly erect petaloids in center forming a flower of distinct appearance and beauty, medium to large, 7 to 9 cm. expanded; color self porcelain-white; outer petals 14 to 19 in 2 to 3 rows, thin, obovate, 4 cm. long by 2 to 3 cm. wide, apices emarginate with broad deep notch, bases tapered, surface smooth; petaloids 20 to 40, forming central part of flower, spatulate to obovate, variable in size, 3 to 4 cm. long, folded, creped, erect or semi-erect, margins laciniated in upper parts; stamens reduced in number, central with petaloids intermixed, filaments light yellow, anthers golden; leaves thick, elliptic, 3.5 to 5 cm. long by 2 to 3.5 cm. wide, curved, flat or slightly keeled, dark glossy green above, lighter glossy green beneath, midrib prominent above, margins with medium crenulations; a vigorous, free-flowering shrub forming an open irregular vasiform head with curved branches. One of the best varieties.

OLEIFERA (Japan). Flower single, cupped, showy, large, 9 cm. expanded; color white, margined and washed on outer parts with rose-bengal 25/2, sometimes almost white throughout; petals 6, obovate, large, 5 cm. long by 3 cm. wide, creped, apices emarginate, bases tapered; leaves thick, elliptic, 6 cm. long by 3 cm. wide, curved and slightly keeled, dark glossy green, apices abruptly short blunt pointed, bases round or tapered, petiole short. This variety with all the characteristics (musty scent, loosely attached stamens, hairy twigs, etc.) of the Sasanqua group, is an importation from Japan by way of the Royal Botanic Gardens, Kew, England.

The name "oleifera" should be replaced with its proper Japanese name if it can be determined, or another distinct name should be given to distinguish it from the oil-bearing camellia of China, *C. oleifera*. It is a fine variety with cupped, creped flowers of high quality.

PAPAVER (Sawada). Flower single, large, cupped, 9 cm. expanded; color solferino-purple 26/2; petals 7 to 9, broadly obovate, creped, medium, 3.5 to 4 cm. long by 3 to 3.5 cm. wide, apices emarginate with broad deep notch, bases slightly tapered or round; leaves elliptic, thick, 5.5 cm. long by 3 cm. wide, dark glossy green, apices abruptly blunt pointed, bases tapered slightly, margins coarsely crenulate; compact, upright with slender branches. A good, free-flowering variety formerly known as Rosea Papaver.

PINK SNOW (Hines). Flower incomplete double, 5 cm. wide by 2 cm. high; color chromatic self, rhodamine-pink 527/1 to 527/3; calyx small, irregular in outline; sepals 6, small, 8 to 10 mm. wide, round, cupped, green on inner, tan on outer surface; petals 10, small, 2.8 by 2 cm., obovate, margins entire, apices rounded with small notch, bases tapered; petaloids 12, small, variable in size from mere strips to some measuring 2 by 1.5 cm., erect, incurved at tips, irregularly notched, bases tapered, color same as outer petals, lighter toward bases; stamens central, shorter than the petaloids and hidden among them, curved, irregular in length, about 1 cm. A flower of pleasing appearance, good form and bright color. Worthy of propagation. Pink Snow is a seedling Sasanqua brought into flower by Paul E. Hines, Beaumont, Texas. Mr. Hines has stated that flowers are larger than the one described, reaching 7.5 cm. when fully expanded.

ROSEA. Flower single, medium to large, 7.5 to 8.5 cm. expanded, opening flat; color self rose-bengal 25/1; petals 5, large, 4 cm. long by 3.5 cm. wide, one petal in a flower often smaller and shorter than the others, obovate-rectangular, apices emarginate with broad notch, bases round or slightly tapered, surface creped, margins wrinkled; stamens numerous, flared, 2.5 cm. across the cluster; leaves elliptic, 3.5 to 5 cm. long by 1.5 to 2.5 cm. wide, much curved, slightly keeled, dark glossy green, finely crenulate; shrub tall, upright, forming a somewhat open, dark glossy green mass, flowers borne on slender twigs. Rosea is one of the first, if not the first, of Sasanqua varieties grown in America and for many years was the only variety available in the nursery trade. It was introduced from England and catalogued by William Prince in

1822. Presumably it is of Japanese origin. It is an early, free-flowering variety satisfactory as a garden shrub.

ROSY MIST (Sawada). Flower medium, 7 to 7.5 cm. expanded; color self rose-bengal 25/3; petals variable in number, 7 to 10, broadly obovate to orbicular, 4 cm. long by 3.5 cm. wide, apices somewhat creped, emarginate, bases tapered; stamens wide spreading, light yellow, 1.5 cm. long; leaves elliptic, 7 cm. long by 4 cm. wide, curved, keeled, very dark glossy green, apices rounded or slightly tapered to a very sharp point, bases slightly tapered or round, margins coarsely crenulate. Formerly listed as Rosea Magnifica.

SHICHIFUKUJIN (Japan). Flower single, medium to large, 8 cm. expanded; color white at center, flushed rose-bengal 25/3, and on the back of the petals 25/2; petals 8, with an occasional petaloid, medium, irregularly orbicular, 3 to 4 cm. long by 3.5 to 4 cm. wide, apices waved, bases round, wrinkled, surface wrinkled, margins wrinkled; stamens numerous, flared, 3 to 3.5 cm. across the cluster, filaments curved, light yellow, anthers golden; leaves elliptic, curved, slightly keeled, 3 to 5 cm. long by 1.5 to 3 cm. wide, apices tapered to a sharp point, bases tapered, margins finely crenulate.

SEAFOAM (Semmes). Flower medium, 7 cm. wide; color white, margin shaded magenta 27/2; petals 5, medium, 3 cm. long by 3.5 cm. wide, suborbicular, apices emarginate, bases rounded, margins creped; stamens spreading; leaves elliptic, small, 4 cm. long by 2 cm. wide, curved, keeled, apices tapered to a small medium point, bases slightly tapered, margins finely crenulate; shrub compact, dense, with numerous branches well covered with foliage. An excellent hedge and garden plant.

SETSUGEKKA (Japan). Flower single, large, flat, 8 to 9 cm. expanded; color white with faint flushing of solferino-purple 26/3 around the outer edges, deeper colored on the back; calyx firmly attached; petals 8, suborbicular, 3.5 cm. long by 4 cm. wide, apices truncate, bases round, margins waved and creped; stamens spreading, 1.5 cm. long, light straw colored; leaves stiff, coriaceous, elliptic, 6 cm. long by 3 cm. wide, apices short, blunt pointed, bases slightly tapered, margins slightly, coarsely crenulate; twigs slender.

SHINONOME (Japan). Flower large, 7 cm. expanded; color self bengal-rose 25/3; petals 9, medium, 4 cm. long by 3 cm. wide, obovate, surface creped, apices truncate, bases tapered; leaves elliptic, 4 to 6 cm. long by 1.5 to 3.5 cm. wide, slightly curved, keeled, dark green, apices tapered to a blunt point, bases round or slightly tapered, margins coarsely crenulate.

SHISHIGASHIRA (Japan). Flower semi-double to incomplete double (when fully open), double imbricated in first stage of opening, small to medium, 4.5 cm. expanded or somewhat larger, 2 cm. high; color self rose-bengal 25 to 25/1; calyx small, green; sepals firmly attached, small, cupped; petals 17 and 4 petaloid, inner ones erect, outer flat or reflexed, small, obovate to almost orbicular, 2.25 to 2.5 cm. long by 2 cm. wide, apices round, emarginate with small notch, bases round or slightly tapered, surface smooth, margins entire, smooth; stamens greatly reduced in number, short; leaves elliptic, 5 cm. long by 3 cm. wide, dark glossy green, curved, almost flat, apices depressed, tapered to a blunt point, margins finely crenulate. This variety has a dainty bright flower of distinct beauty.

SHOWA-NO-SAKAE (Japan). Flower double irregular, medium, 8 to 9 cm. expanded; color chromatic self rhodamine-pink 527 to 527/3 with the lighter color toward the base; petals 8, obovate, medium, 3.5 cm. long by 2.5 to 3 cm. wide, apices emarginate, sometimes double notched, bases tapered, margins entire, smooth; petaloids numerous, filling the center, variable in size from mere flags to larger ones 3 cm. long by 1.5 cm. wide; stamens shorter than, hidden by and scattered among the petaloids; leaves large for the group, 5.5 to 5.6 cm. long by 3 cm. wide, elliptic or slightly obovate, curved, slightly keeled, apices tapered to a blunt point, bases tapered, margins with medium crenulations, petiole short, 5 to 6 mm., stout, curved. This variety ranks among the finest of the Sasanqua camellias.

SPLENDOR (Sawada). Flower single, large, 9.5 cm. expanded; color solferino-purple 26/3, somewhat lighter toward the center; petals 8, large, 5 cm. long by 3.5 cm. wide or somewhat smaller, usually 2 or 3 erect, obovate, apices emarginate with broad notch of medium depth, bases tapered, surface wrinkled, margins wrinkled, sometimes reflexed; stamens with light-colored filaments, flared, group 2 cm. across; leaves elliptic, apices and bases both tapered, slightly curved and keeled, finely crenulate. This variety is a free-flowering, vigorous-growing, compact shrub. Formerly listed as Rosea Grandiflora.

TANYA (Coolidge). Flower single, small to medium, 7 to 8 cm. expanded; color bright self rose-madder 23/1; petals 5, medium, 4 cm. long by 3 cm. wide, obovate to wedge shaped, apices emarginate with deep notch, bases tapered, surface smooth (not creped), margins entire, smooth; stamens flared, yellow in a central group 3 cm. across; leaves elliptic, small, 4 to 5 cm. long by 1.5 to 2.5 cm.

wide, keeled, slightly curved, apices tapered to a blunt point, bases tapered, margins finely crenulate. Valuable for its bright-colored, rose-madder flowers.

TEXAS STAR (Magee). Flower single, small, 6 to 8 cm. expanded, appearing as though notched around the outer edge of the flower; color chromatic self rhodamine-pink, lighter toward center; petals small, 3 cm. long by 2.5 cm. wide, obovate to almost rectangular, apices emarginate, creped, bases tapered; stamens lemon-yellow, short; leaves thick, narrowly elliptic, 4 cm. long by 1.5 cm. wide, dark glossy green, apices pointed, bases tapered, margins crenulate, petiole very short; shrub strictly upright, compact. This variety is unusual because of its erect branching habit and compact growth. Grown from imported seed by Price Magee.

USU-BENI (Japan). Flowers incomplete double to complete double irregular, small to medium, 6 to 7 cm. expanded; color chromatic self rose-bengal 25/2 to 25/3, sometimes with irregular white blotches; petals 7 with about 21 petaloids, obovate, small, 4 cm. long by 3 cm. wide, apices irregular in outline, bases tapered, margins creped along upper part; stamens variable in number, 2 cm. long, central, light yellow, hidden among the petaloids; leaves obovate, 6.5 cm. long by 3 cm. wide, dark green, apices abruptly tapered to a short point, bases tapered, margins with medium coarse crenulations; flower buds dark rose just before unfolding.

VELVETY (Sawada). Flower single, large, 8 cm. expanded; color magenta 27 to 27/1; petals 7 or 8, suborbicular, 3.5 cm. long by 4 cm. wide, magenta, lighter along center, apices truncate, broadly, shallowly emarginate, bases rounded to a short haft, stamens short, light yellow; leaves broadly elliptic to obovate-elliptic, 5 to 6 cm. long by 2.5 to 3 cm. wide, dark green, flat, apices abruptly tapered to a small point, bases tapered, margins crenulate. A strong-growing shrub with good flowers. First catalogued as Crimson Velvetti in 1941; changed in 1948.

VERSICOLOR (Sawada). Flower single, medium, 7.5 to 8 cm. expanded; color white at center with broad area of solferino-purple 26/2 around the outer edge; petals 5 to 7, small to medium, suborbicular, 3.5 cm. long by 3 cm. wide, apices emarginate with shallow notch, bases tapered; stamens light yellow, spreading; leaves thick, small, 5.5 cm. long by 3 cm. wide, dark glossy green, apices blunt, bases round or slightly tapered, margins coarsely crenulate.

WHITE QUEEN (Sawada). Flower single, medium to large,

9 cm. expanded, opening flat; color self white, sometimes with a single petaloid upright in center; petals 8, rounded rectangular, 4.5 cm. long by 4 to 4.5 cm. wide, apices shallowly, broadly notched, bases tapered, margins creped, eroded; stamens numerous, light yellow, flared, 2.5 cm. across the cluster. A single white variety with good substance in its petals.

WILLOW LEAF (Sawada). Flower single, medium, 7.5 cm. expanded; color white shaded rose-bengal 25/1 to 25/2 on the outer edges; petals 7, obovate, medium, 4 cm. long by 3 cm. wide, surface creped, apices truncate, emarginate, bases tapered; stamens spreading, light yellow; leaves curved, keeled, lanceolate to lanceolate-elliptic, dark glossy green, apices tapered to a sharp point, bases long tapered, margins finely crenulate; shrub dense headed, well covered with foliage, upright-cylindrical. This variety is very unusual in its narrow, handsome foliage and compact habit.

7

MISCELLANEOUS CAMELLIAS

Species and Varieties

WHILE camellias grown in gardens at this time belong, for the most part, to two species, *C. japonica* and *C. Sasanqua*—many more to the former than to the latter—there are other species represented by a limited number of varieties, and still other kinds the exact botanical relationships of which are in doubt. Further study based on herbarium specimens and living plants not now available, will be necessary before their botanical sources can be determined. Lack of this knowledge does not, of course, militate against their value for garden uses, but it would be much more satisfactory if their botanical connections were known.

Culture of two camellias extends far back in the history of east Asian horticulture. These are *C. oleifera*, grown for its seeds from which an oil is secured, and *C. sinensis*, the leaves of which are used in making tea. Both became important in China centuries ago, and tea was one of the chief items in the cargoes of the ships of the East India Companies from the very beginning of their trading operations with the Orient.

C. oleifera and *C. sinensis* long cultivated

Some of the camellias discussed in the following pages have been known in Europe and America for many years, in some cases for a century or more. Others are of recent introduction. *C. reticulata* dates from 1820 and *C. maliflora* from 1816, the years in which they were brought to England. Both were in the United States as early as the 1830's. Now the single-flowered form of *C. reticulata* has been secured, and some day living plants of single-flowered *C. maliflora* will be in-

troduced. It is growing somewhere in the hinterlands of China. Two species are quite new: the description of *C. cuspidata* was first published in 1900 and of *C. saluenensis* in 1936. Several species of camellia are likely to prove valuable ornamentals for American tropical and near-tropical areas, but for the most part these have not been studied. In this connection, particular attention is called to *C. hongkongensis*. This species, as well as a number of others native in the tropics, should be introduced and tested, not only in tropical areas but in warm temperate sections too.

Among the miscellaneous species there are some that are valuable garden plants in their wild forms, and if they are given no further attention beyond what they have received thus far, their discovery and introduction will definitely have been worth while; but since they were taken from China to England, other forms have been secured from them by crossing and selection. This work has only been started, but it has been carried far enough to show beyond question the great possibilities they have as parents of new races and different varieties. Not only will these be valuable for all regions where camellias are now grown, but some of them perchance will extend camellia culture into areas where they are not grown now. Two centuries have passed since camellias came to the western world, and in that time varieties of gay and surpassing beauty have come into existence, so different from those first introduced as to seem unreal by comparison. In years to come camellias of today will be matched or even surpassed in other color shades and forms of extraordinary beauty. These new sorts will be derived in part from the miscellaneous varieties and species discussed in the following pages.

New varieties secured by crossing

Citations covering Cornish Snow, Donation, J. C.

Williams, Mary Christian, Mary Williams, Reticulata (unnamed seedling), Salutation, St. Ewe and Superba in the following pages have been taken from the Journal of the Royal Horticultural Society, London.

C. cuspidata. Augustine Henry collected herbarium specimens of *C. cuspidata* at Ichang, Hupeh, China, in 1877. It was described and named *Thea cuspidata* by Julius K. Kochs in 1900, in reference to its leaves, which are quite unusual for a camellia. E. H. Wilson in 1900 collected seeds of it from the same locality in Hupeh. From these seeds, plants were raised and flowered by Messrs. Veitch at their Coombe Wood Nursery in England. It was given an Award of Merit by the Royal Horticultural Society, London, when it was exhibited in flower, April 2, 1912.

C. cuspidata introduced

C. cuspidata is quite unlike any other camellia commonly found in gardens. Its upright open habit, slender twigs and branches and narrow long-pointed leaves (for which it was named) give it an appearance so different from *C. japonica* and *C. Sasanqua*, the species so commonly grown as to be considered typical of the genus, that it is scarcely recognizable as a camellia. Its foliage covering is much less dense than that of the two species just mentioned. It makes an attractive, graceful shrub or small tree, a distinct addition to any collection of camellias. It is believed to be very hardy, perhaps more winter resistant than *C. japonica*. E. H. Wilson stated that it is the hardiest of all camellias. At any rate, it is growing at various points in the open in the Channel Counties of England from Cornwall to Sussex and Surrey, and in the island of Guernsey. In parts of this area, winters are sometimes cold, with snow and ice.

One horticultural variety, a real prize named Cornish Snow, has been secured by crossing this species

with *C. saluenensis*. This variety, originated by the late Mr. J. C. Williams, was exhibited at a Royal Horticultural Society exhibition in 1948 by Mr. Charles Williams and received an Award of Merit:

"Camellia '**Cornish Snow.**' A. M. February 17, 1948. A very distinct hybrid raised at Caerhays by the late Mr. J. C. Williams from a cross between *Camellia saluenensis* and *C. cuspidata*. It is a freely branching, evergreen shrub with narrow-ovate, finely serrate, dark green leaves and flowers produced singly or two together in the leaf-axils. The white corolla is composed of about eight rounded petals and contains a cluster of yellow stamens. Exhibited by C. Williams, Esq., M.P., Caerhays Castle, Gorran, R.S.O., Cornwall." Cornish Snow

C. hongkongensis. Gaudichaud found this camellia in Cochin-China in 1837, and it was discovered on Hong Kong island circa 1847 by Lt. Col. Eyre. Later it was collected by others, including Dr. Berthold Seemann, who at first believed it to be *C. japonica* but who later decided because of its free styles, hairy ovary and narrow sharp-pointed leaves that it was a different plant new to botanical science. He described and named it *C. hongkongensis* in 1859. His description was accompanied by an excellent illustration in Volume XXII, "The Transactions of the Linnæan Society of London."

Dr. Seemann said that three specimens were on the island when he made his collection, and later Major Champion stated there were but two. About a century later G. A. C. Herklots* wrote, "This camellia is now one of the commonest species of its genus on the island; in the space of 99 years, under protection it has multiplied and spread until there are now probably hundreds of trees in the district where

*Bulletin No. 1. Agr. Dept. Hong Kong Govt. 29. Apr. 1948.

it was originally found near the top of the old Aberdeen road. It is also in the little Hong Kong woods. Isolated trees exist in other places." These statements suggest that it may be an introduced tree, perhaps from Cochin-China where it was discovered first, which found a congenial home on the island of Hong Kong and became feral. If this be true, it is not the only example of a foreign plant that escaped from cultivation on the island. The island of Hong Kong is just within the tropics and but little above sea level.

C. hongkongensis

Plants of *C. hongkongensis* grown from seed are in the Kew Gardens' collections, and there are specimens in the collection of Lt. Col. L. R. C. Messel, Handcross, Sussex, from the same source. The species is not likely to prove hardy in colder sections, but it may be valuable for warmer areas. Plants are now growing in the collection of the Florida Agricultural Experiment Station from seed received from Hong Kong, China.

C. maliflora. This is a rare species in American camellia gardens, especially in those located in the South and Southeast. Since the type plant is incapable of seed production and no additional forms have been introduced, so far as the records show, it is represented now only by vegctative propagations apparently from the original brought to England in 1816 by Captain Richard Rawes, which bloomed in 1818 and was named *C. maliflora* by John Lindley in 1827. In "Hovey's Magazine" for February, 1835, *C. maliflora* is listed among varieties expected to bloom shortly in Boston collections (item dated January 15), and in the June number of the same year, C. M. Hovey reported having seen it in flower in the Robert Buist collection in Philadelphia, March, 1835.

C. maliflora

A plant of this species was set out at the Woodruff home, North Raymond Avenue, Pasadena, Calif.; the exact date of planting and the source from which it came are unknown. Vern McCaskill, Pasadena, unaware of its exact identity, propagated from this specimen and named it Betty McCaskill for his daughter. Since this name is widely known for this plant, it is retained here; at the same time it is pointed out that this is the type of the species *C. maliflora*. For many years it was grown at the Royal Botanic Gardens, Kew, England, under the name *Camellia rosiflora flore pleno*, until J. R. Sealy and J. Couts, in 1935, correctly determined that it was Lindley's *C. maliflora*. *C. maliflora*

C. maliflora is a neat, beautiful, free-flowering plant with attractive flowers that probably equals *C. japonica* in hardiness. A fine specimen at Scorrier House in Cornwall, England, growing against a wall, is about 18 feet high and 6 feet through the top. It was planted long ago. Propagation, before its identity was known, was started in California by Vern McCaskill under the name **Betty McCaskill.** Flower incomplete double, opening flat, small, 3.5 to 5 cm. or occasionally 6 cm. wide (R.H.S.); color camellia-rose 622/1 to 622/3, light colored to white in the center with darker color at edges and on backs of outer petals; calyx small, slightly cupped; sepals small, round, green with narrow tan margins; petals in 4 rows, round-oblong, 2 cm. long by 1.75 cm. wide, round and shallowly emarginate at the apices, bases rounded to a small short haft; stamens small, not prominent, single or fascicled, central or scattered among the petals; pistil malformed; when the flowers drop, they fall in one piece; leaves elliptic-ovate to ovate, small, 4 to 6 cm. long by 2 to 3 cm. wide, curved, slightly keeled, apices mostly tapered abruptly to a short point, smaller leaves blunt

or round, bases slightly tapered or round, glossy green above, lighter glossy green beneath, margins finely serrulate, petioles short, sparsely hairy, twigs stiff, slender. It is an upright shrub with slender branches, twigs well clothed with foliage, forming a dense head, reaching a height of 5 to 6 m.

C. oleifera. *C. oleifera* was described in 1818 by Dr. Clarke Abel as a new species of camellia. He had seen it growing in China where he went as physician to an embassy sent out by the British government in 1815.

C. oleifera Although grown widely in China for centuries for its seeds from which an oil used for various domestic purposes is extracted, this camellia has received no attention in western gardens because it is not particularly valuable as a flowering evergreen. It is an openly branched shrub with white flowers and thick, dull green, leathery leaves.

Plants raised from seed imported from China are now growing in several places in the United States, but there are no horticultural varieties of it such as represent other species. To the Royal Botanic Gardens, Kew, England, a camellia was introduced some years ago, grown and distributed as *C. oleifera.* It was brought also from Kew to the United States, where it has been propagated and handled in the nursery trade as *C. oleifera*, the oil-bearing camellia of China. It is nothing more or less than a very good variety of *C. Sasanqua.* The true species, *C. oleifera*, recently introduced is now in the Kew collections. There also are plants of *C. oleifera* grown from imported seed, as well as some secured from other sources, in the camellia collection of the Florida Agricultural Experiment Station.

C. reticulata. Introduction of *C. reticulata* to western gardens centers around three incidents: (1) bringing

the species to England in 1820 and 1824, (2) arrival in the early 1850's of what was described later as a more double form, and (3) finding the wild, single-flowered form in China and collecting its seeds in 1912, 1913, 1924 and 1925.

John Reeves

During a period of about twenty years (1812–1831), John Reeves was located at Canton, China, first as assistant inspector and later as chief inspector of tea for the East India Company. He was greatly interested in ornamental plants and was instrumental, both directly and indirectly, in introducing numerous species and varieties to English gardens. Many plants brought to England by others really should be credited to John Reeves, because he collected them, established them in pots and packed them for their long sea journey. Even though there were strictly enforced Chinese regulations against foreigners going outside the immediate environs of Canton, he probably secured plants from areas farther inland through the assistance of the native population and, of course, he had the gardens of Canton as a near-by source of living specimens. Doubtless he had something to do with the introduction of *C. reticulata*.

While the records are incomplete, from what is known now it appears that more varieties of camellias reached England in ships of the East India Company commanded by Captain Richard Rawes than were brought in by any other ship captain of that period. In 1820, *C. reticulata* was part of one of his cargoes. It probably came from a Canton nursery garden and passed through the hands of John Reeves. It was flowered by Thomas Cary Palmer, Bromley, Kent, in 1826. A second importation of the same plant in 1824 was due to the efforts of John Damper Parks, a collector for the London Horticultural Society.

C. reticulata comes to England

Plants of the 1820 and 1824 introductions were recognized by John Lindley as being different from other camellias. He described them as a new species in the "Botanical Register" (1827) and named it *C. reticulata* because of the clearly defined veining of the leaves. This form, imported by Rawes and later by Parks, is the type of the species, although its flowers are partly double, and it has been grown in English gardens and greenhouses from the time of its introduction down to the present. Exactly when it came to America is not known, but *C. reticulata* blooms were exhibited by Marshall P. Wilder in 1836 at a Massachusetts Horticultural Society flower show. It does not appear to have been grown continuously in the United States from the time of its first introduction, and plants now in the country apparently trace back to specimens imported in more recent years.

C. reticulata continued

Robert Fortune, a plant collector for the Royal Horticultural Society, successor in name of the London Horticultural Society, in the early 1850's (the exact year is uncertain) collected a camellia in China, probably at Canton. It reached England, was established and bloomed. In April, 1857, it was described in the "Curtis Botanical Magazine" as *Camellia reticulata flore-pleno* (double-flowered *C. reticulata*). The illustration that accompanies the description shows an incomplete double flower; there are stamens in its center. What has become of it no one seems to know, but certainly it is not widely known in England now. There is the possibility that it was nothing more than a variant of the first introduction to which it reverted and so has disappeared.

C. reticulata flore-pleno

From 1904 until he died in China in 1932, George Forrest made seven trips to China to hunt for new or different plants for English gardens. He was interested

principally in securing magnolias and rhododendrons. Much collecting was done in Yunnan. There in the western part of the province in the hills about Tengyueh he collected seeds of a camellia that grew in pine woods, thickets and scrub. When flowered in England by the late Mr. J. C. Williams, Caerhays Castle, Cornwall, it proved to be a single-flowered *C. reticulata*. It was so identified by Dr. O. Stapf, and later it was described by J. R. Sealy of the Royal Botanic Gardens, Kew, England, with an illustration by L. Snelling in the "Curtis Botanical Magazine," t. 9397, 1944.

Introduction of single-flowered *C. reticulata*

Among camellias, none produces more beautiful flowers than *C. reticulata* when they are at their best. By many they are regarded as the finest of all. They have a bright sprightliness that is present in few others. The petals are not closely pressed down upon one another. They stand apart, and there is a play of light among them that is very pleasing. This is caused in part by appressed hairs along the backs of the petals and the reflection of light from them. The flowers are large, perhaps at times the largest of all.

C. reticulata is excellent for greenhouse culture. Trees flower abundantly and eventually reach large size. The largest specimen noted by the writer is in the Temperate House at Kew Gardens, 30 feet or so in height and as much across the branches. At Caerhays Castle, Cornwall, the largest specimen measured by Mr. Charles Williams was 24 feet high by 15 feet 3 inches wide in 1948. It is an openly branched tree and the leaves are borne out toward the tips of the branches. It does not present the compact, well-foliaged mass of *C. japonica*. Specimens grown from seed brought in by Forrest or from seed of a second generation produced in England are much more compact. The type, which is the one described by Lindley

C. reticulata in England

in 1827, blooms in midseason. In the open garden without protection it has not proved satisfactory in the South and Southeast. It is not so hardy as *C. japonica* but even where it grows all right, it is likely to lose all flower buds when temperatures are registered in the lower twenties or lower.

Propagation by cuttings is difficult and for the commercial producer of plants scarcely worth attempting, unless or until some method of handling them that will give good results is developed. It may be grafted on *C. japonica* and *C. Sasanqua* stocks in the usual way by cleft-grafting (see Chapter 9), and in the hands of skilled grafters results are satisfactory.

Since no seedlings have arisen from the first introductions of *C. reticulata* and no different varieties have developed as sports or variants, the species has been limited until recently to the original form or forms brought to England from the Orient in 1820, 1824 and the 1850's. Introduction recently of the single-flowered, seed-bearing wild form has made possible the raising and selecting of seedlings. A beginning has been made already, and the development of a race of Reticulata camellias from this source is in sight. At this time, the species is represented by at least five different forms, and there are rumors of others. These are: the type, the single wild form, Superba, a variety named Mary Williams and an unnamed seedling. The last three have received Awards of Merit from the Royal Horticultural Society.

A new Reticulata group

Strange though it seems, for plant hunters had been there, five horticultural varieties of *C. reticulata* growing in Yunnan, particularly in Kunming, were overlooked. It remained for Dr. Walter E. Lammerts, with the help of Chinese botanists and plantsmen, Dr. H. H. Hu, Dr. T. T. Yu and Mr. H. Tsai, to secure a fine col-

lection of these. They reached San Francisco, March 15, 1948. In the spring of 1949, Mr. Ralph S. Peer imported another lot and succeeded with a few. Now these new Reticulatas are growing in the United States and some also are in England. Another camellia chapter has opened.

C. reticulata type

C. reticulata (*China*) (type). Semi-double to incomplete double. Flower medium to large, 9.5 cm. wide and wider by 4.5 cm. high; color self rose-madder 23 with bright glistening sheen, lighter in the center; calyx cupped, large, suborbicular, 4 cm. wide; sepals round, cupped, outer ones tan, inner ones yellowish with narrow light tan margins; petaloid sepals 5, well covered with silvery pubescence; petals 15 in 3 rows, obovate, creped, undulated, their outer central areas with shining appressed hairs, 5 by 4 cm., creped particularly along the edges, apices notched, bases tapered; stamens 141, 3 cm. long, filaments slender, fascicled, united in the lower third, curved, tinted, anthers at first yellow but *soon becoming black;* pistil abnormal or malformed, ovary hairy, lobed; leaves oval-lanceolate, 5.5 by 2 cm., 9 by 4.5 cm., keeled, curved from petiole to apex, dull green, the under surfaces glossy, lighter, firm, veins depressed, reticulated, margins with fine, sharp, stiff serrations, each terminated by a black tip. This is the type form of *C. reticulata*.

C. reticulata (single wild form). Flowers borne singly or in pairs in the uppermost leaf axils, single, 9 cm. wide; color rose; petals 5 or 6, obovate to broadly spatulate, 5 to 7 cm. long by 3 to 4 cm. wide, apices round-emarginate with a broad shallow notch, bases tapered to a narrow haft; stamens numerous, united for about one-half their length to form a cylinder; anthers yellow, becoming black soon after the flowers open; fruit globose, about 3.5 cm. in diameter, tan

colored, hairy; leaves large, 9 to 11 cm. long by 3.5 cm. wide, dull green, thick, stiff, smooth, serrulate with fine teeth, curved, keeled, sharp pointed.

"*Camellia reticulata* var. **Superba.** A. M. February 17, 1948. A fine seedling from one of the plants raised from seed collected by Forrest. It is remarkable for the eight to ten, wide-spreading, vivid carmine (H.C.C. 26/1) petals, shaded on the outside with turkey-red. The diameter of the open flower is 4 inches. Exhibited by C. Williams, Esq., M. P., Caerhays Castle, Gorran, R.S.O., Cornwall."

"*Camellia reticulata*—**Mary Williams.** A. M. March 17, 1942. This is considered by the exhibitor to be one of the finest of the several forms of *Camellia reticulata* raised from Forrest's later collections of seed around Tengyueh in Western Yunnan (No. 27165). The flowers are fully four inches across, with six to eight broadly ovate, notched petals of firm texture. The colour of the petals varies about crimson (H.C.C. 22/1) and rose madder (H.C.C. 23/1). The flower depicted at t. 9397 of the Botanical Magazine, drawn from a cultivated specimen of Forrest's No. 25352, although slightly smaller, is very similar in colour and form to 'Mary Williams.' Exhibited by C. Williams, Esq., M.P., Caerhays Castle, Gorran, Cornwall."

C. reticulata single-flowered

"*Camellia reticulata—Seedling* (unnamed). A. M. March 21, 1944. This is one of the wild, single-flowered forms raised from seed collected by Forrest in Yunnan. The flowers are narrowly cup-shaped, 3 to 4 inches across, and have usually from five to seven obovate petals varying in colour from Camellia Rose (H.C.C. 622) to crimson (21/1). Exhibited by Capt. E. de Rothschild, Exbury, Southampton."

C. saluenensis. This particular species was discovered in China in the province of Yunnan by George Forrest

during his explorations for plants. He found it as a native shrub in the mountains along the Shweli and Salwin rivers in the general vicinity of Tengyueh growing on cliffs and rocky or grassy slopes, in thickets and amongst scrub, at elevations of 6000 to 9000 feet, sometimes in shade, sometimes in open spaces. He found it in flower in March and April and in fruit in September and October. Specimens in native habitats were 4 to 15 feet high; some bore white flowers, others pink, deep rose or crimson. In growth habit they also varied considerably, and judging from the herbarium specimens that were collected, it varied in foliage characters as well. When the soil, exposure, elevation and other environmental conditions under which Forrest found it growing are considered, it is not strange that it was found to be a variable species in its native habitats.

C. saluenensis

Seeds were collected by Forrest in different years of his explorations and sent to England. Plants were secured from them, and the species is now represented by specimens in considerable numbers. In addition to those grown from Chinese seed, there are now plants grown from seed produced in England. Plants raised from both Chinese and English seed show variations in color of flowers, leaf characters, growth habit and freedom of blooming. Certain features in these plants are common to all, but at the same time they vary from one another in some particulars. Those brought into bloom so far produce single flowers, but in other ways they present something of the same differences as are found among camellias belonging to the Japonica and Sasanqua groups now cultivated.

Forrest's collections

C. saluenensis forms compact specimens with numerous branches covered by abundant foliage. The leaves are dark, glossy green above, lighter on the

undersides. Between each pair of side or lateral veins, the upper surfaces of the leaves are elevated or puffed up (bullate) and the veins appear as though sunken or depressed. This gives the leaves a dainty effect different from the smooth-surfaced leaves of *C Sasanqua* and *C. japonica*. Flowers are produced abundantly by some plants, and the impression created by such specimens when in bloom is that they are completely covered with flowers. Mr. Charles Williams has furnished the dimensions of some of the Saluenensis specimens in the Caerhays Castle plantings. Three plants grown from seed collected by George Forrest in Yunnan had developed heads by 1948 that were 15 feet 10 inches high by 17 feet 4 inches wide, 16 feet 4 inches high by 14 feet 8 inches wide and 17 feet high by 14 feet wide, respectively. Two specimens grown from seed produced in England, and consequently several years younger, measured 11 feet high by 9½ feet wide and 12 feet high by 8 feet wide. The measurements indicate that varieties belonging to this species will equal those belonging to *C. japonica* in size. What dimensions they will ultimately reach remains to be seen. The Saluenensis plants have made fine, compactly headed specimens.

C. saluenensis at Caerhays Castle

The largest collections of this species in England are at Caerhays Castle, Trewithen and Exbury, although there are specimens at other points in the milder counties. Indications are that it may be as winter resistant as *C. japonica*, but since it has not been tested widely, its exact range of adaptability has not been determined. As yet, the group is practically unknown in America.

Since *C. saluenensis* is variable, both in the wild and in cultivation, it will no doubt prove to be a valuable plant in the hands of the plant breeder. From it

a new race of camellias can and will be developed. A good start already has been made. It has been found that it will cross with other species, and some very interesting varieties have been obtained. Six are listed as varieties secured by crossing. One named Williams Lavender, grown from seed imported from England, is catalogued in America. Five have received Awards of Merit from the Royal Horticultural Society, London: Citations for these five, and notes on them, are given herewith.

Variations in *C. saluenensis*

Appleblossom (Japan). Flower single, sweet scented, small, 7 to 8 cm. wide, 3 cm. high; color white flushed pink with deeper color on outer petals; calyx cupped, roughly triangular; sepals 6, 1.5 by 1.2 cm., 2.3 by 1.3 cm., oblong, margins thin, pale green with tan edges; corolla widely trumpet shape with tips recurved; petals 7, rectangular-oval, bases rounded; stamens central, forming a cylinder, filaments separated in the upper half, slender, light yellow, 2.3 to 3 cm. long; style 3-parted, green tipped, light yellow below; ovary villous; apparently fruit is not produced; shrub densely branched with gray twigs, young shoots and leaves glabrous; leaves flat, curved, dark green, bases tapered, apices sharp pointed (acuminate), margins finely serrate. It has been placed in the species *C. saluenensis*, but there may be some doubt as to its relationships.

"*Camellia* **'Donation.'** A. M. March 25, 1941. The parentage of this handsome hybrid Camellia is stated to be *C. saluenensis* × *C. Donkelaari*. The semi-double flowers, when fully expanded, are 4 to 5 inches across. The rounded petals are entire or slightly notched at the tips, and of a pleasing soft rose colour. Shown by Colonel Stephenson R. Clarke, C. B. Borde Hill, Haywards Heath." This variety shows some tendency toward doubling.

Inamorata. This variety is described as a new hybrid between two species of camellias secured by pollinating flowers of *C. saluenensis* with pollen from the wild form of *Camellia reticulata* by Mr. Francis Hanger, Curator, Royal Horticultural Society Gardens, Wisley, England. It is illustrated in color in the Journal of the Royal Horticultural Society, 283–284, fig. 121, September, 1948. The flowers are single, 3 to 4 inches in diameter, open flat, rose-pink. The cross was made by Mr. Hanger in his garden at Exbury. Apparently the variety is hardy enough to stand the winter climate of Wisley, where it has grown and flowered well.

C. saluenensis crosses

"*Camellia* × **'J. C. Williams.'** F. C. C. March 17, 1942. The parents of this hybrid, which was raised by the late Mr. J. C. Williams at Caerhays, are a pale-flowered form of *C. saluenensis* (Forrest No. 24090) and *C. japonica*. The flower is four inches in diameter, with six or eight spreading or somewhat recurved petals of Phlox pink (H.C.C. 625/3) shading to fuchsine-pink (H.C.C. 627/3) and a central cluster of golden stamens. The plant is remarkable for the freedom with which it produces flowers, the buds opening successively over a long period. Exhibited by C. Williams, Esq., M.P., Caerhays Castle, Gorran, Cornwall."

"*Camellia* × **'Mary Christian.'** A. M. March 17, 1942. This was raised by the late Mr. J. C. Williams from a cross between *C. saluenensis* (dark-flowered form of Forrest No. 24090) and *C. japonica*. The flower is cup-shaped, flattening later, about 3½ inches across, in colour Phlox pink (H.C.C. 625). Exhibited by C. Williams, Esq., M.P., Caerhays Castle, Gorran, Cornwall."

"*Camellia* **'Salutation.'** A. M. March 24, 1936. From Lt. Col. Stephenson R. Clarke, C. B., Haywards

Heath. A pretty seedling from the cross *C. saluenensis* × *C. japonica.** The large, blush-pink flowers are single or semi-double, with attractively undulate petals. Raised in Clarke's garden at Borde Hill."

"*Camellia* **'St. Ewe.'** A. M. April 1, 1947. Like the previously certified hybrids 'J. C. Williams' and 'Mary Christian,' this arose from a cross made by the late Mr. J. C. Williams between *Camellia japonica* and *C. saluenensis*. In the exhibitor's garden it forms a neat, freely-branching shrub up to 15 feet in height with lustrous deep green leaves 2 to 3 inches long; and bears a succession of broadly cup-shaped flowers about 3½ inches across, each having about nine oblong-elliptic petals, in colour Rose Madder (H.C.C. 23/2) and a central cluster of yellow stamens. Exhibited by C. Williams, Esq., M.P., Caerhays Castle, Gorran, Cornwall."

C. saluenensis crosses continued

Williams Lavender (Fruitland). Flower single, small to medium, 7.5 to 8 cm. wide by 3.5 cm. high, self solferino-purple 26/2; petals 5, obovate, 4.5 cm. long by 4 cm. wide, one usually smaller than the others, overlapping, apices rounded, emarginate, bases tapered; stamens numerous, in an upright compact cylinder separated for one-third their length; leaves thin, firm, leathery, curved, bullate, bright glossy green above, lighter glossy green beneath, oval, 6 cm. long by 3.8 cm. wide, bases round, apices abruptly short pointed, margins narrowly reflexed, finely serrulate; a compactly branched shrub with fine glossy foliage and bright single flowers. Fruitland Nurseries raised this variety from seed secured from the late Mr. J. C. Williams, Caerhays Castle, Cornwall, England.

C. sinensis. All specimens of the tea plant, *C. sinensis*, handled in the nursery trade of the United States are

*Parentage is doubtful, apparently a cross with a Japonica.

grown from seed. For the most part or perhaps entirely, they trace back to introductions of some years ago when there was an interest in producing tea in the South. At that time, seeds of different strains of tea plants, of which there are many, were introduced and planted. After the cultivation of tea was abandoned, as a commercial undertaking, seeds were taken indiscriminately from these plants and used by nurserymen to produce plants for their trade. In consequence, they now vary greatly in several particulars, such as density of branching, size of leaves, size of flowers and freedom of bloom, and there are many poor specimens among them. Plants with compact heads and good foliage that produce an abundance of large, white, sweet-scented flowers, such as are to be found here and there among plants raised from seed, are good ornamentals. These can be selected and reproduced true to type vegetatively by growing plants from cuttings handled at the usual time and in the usual manner.

C. sinensis, the tea plant

In Japanese catalogues a few ornamental varieties of the tea plant have been listed. Three of these are of interest. One has rose-colored flowers, another has unusually large leaves "(*Camellia theifera* var. *macrophylla*)," and a third has variegated foliage "(*Camellia theifera* var. *macrophylla* variegated)." It is possible that these would prove to be worthwhile additions to evergreen garden shrubs for American gardens. They should be introduced and tested. The tea plant was brought to England in 1768 and to America as early as 1772. In the United States at least two attempts have been made to produce tea commercially. One of these was at Greenville, S. C., where Mr. Junius Smith made a planting in 1848. This was given up shortly afterward when Mr. Smith died. The second planting was made about 1889 by Dr. Charles U.

Tea culture in United States

Shepard at Summerville, S. C., and by 1907 approximately one hundred acres had been set out. Tea of good quality was produced, but because the venture was not commercially successful it was abandoned shortly after 1907.

There remain a few varieties of camellia not grouped under any particular species. These are Dawn, Judith, Sa-otome and Sukiya. Further studies are necessary to determine their relationships. There is even the possibility that they may belong to a distinct species that thus far has not been recognized and described.

Dawn, Judith, Sa-otome and Sukiya

Dawn (Japan). Flower semi-double to incomplete double, small to medium, 7 to 8.5 cm. expanded; color white, faintly flushed at outer edge (deeper on the back of the flower) with solferino-purple 26/2—26/3; petals 14 in 2 rows, obovate to obovate-elliptic, 4.5 cm. long by 2.5 cm. wide, apices emarginate, bases tapered, margins smooth, entire, center of flower in incomplete double specimens made up of about 18 petaloids; stamens united about one-third their length, fascicled, all central in one cluster or intermixed with petaloids, light yellow; leaves coriaceous, stiff, curved, keeled, lanceolate, elliptic, 6 cm. long by 2.5 cm. wide, dark glossy green, apices sharp pointed, bases tapered, margins coarsely crenulate, petiole short; free flowering; growth open and spreading; a fine variety.

Dawn was imported from Japan by the Alvin Nursery Company, Alvin, Texas, in 1909, brought to Alabama about 1910 and planted at Grand Bay by K. Sawada. It was propagated and first offered for sale by Overlook Nurseries, Crichton, Ala. It is cold resistant to an unusual degree. The foliage is dark glossy green, the habit of growth upright and it is early to midseason in flowering. In nursery catalogues it is often listed as a Sasanqua variety but in its scent-

less flowers, stamens united in fascicles and glabrous twigs, it differs from that group. Its botanical relationship is uncertain.

Varieties of uncertain origin

Judith (Japan). Flower bud small, elliptic, green; flower single, scented, small, 2.5 to 3 cm. wide, 3.8 cm. high, funnel form; color tyrian-rose 24/2; calyx narrow, upright, green; sepals 8 (including scales), small, 7 mm. to 1 cm. wide, oval, cupped, outer ones green, inner ones silvery green, hirsute; petals 5, thin, small, 4 cm. long by 2.2 cm. wide, oblong, 2.5 cm. long by 2.5 cm. wide, bases tapered slightly, apices tapered to a sharp, slender point, petiole relatively long, 1.2 cm., flattened on upper surface. This camellia has been classified with both *C. japonica* and *C. Sasanqua* varieties but it does not belong with either of them.

Sa-otome (Japan). Flower single, sweet scented, small, 4.5 cm. wide by 3 cm. high; color solferino-purple 26/3 with white areas that shade into the purple color; calyx narrow, cupped; sepals 5, oval, 1.5 cm. long by 1 cm. wide, cupped, green with narrow, broken tan edges; petals 6, small, 3 cm. long by 2.5 cm. wide, oval-rectangular, apices emarginate with shallow notch; stamens numerous, connate, adnate with corolla, filaments slender, light yellow, 2 cm. long, united in the lower two-thirds; ovary hirsute, style 2 cm. long, hirsute at base, 3-fid at apex for a very short distance; flower drops in one piece; leaf blades 7.7 cm. long by 3.8 cm. wide, curved, keeled, elliptic, glossy dark green above, lighter glossy green beneath, bases rounded or slightly tapered, apices tapered to a rather long sharp point, margins finely serrate.

Sukiya (Japan). Flower single, small, funnel form, 4 cm. high by 4 to 5 cm. wide; color self rhodamine-pink 527/2; calyx funnel form; sepals green with narrow tan edges; petals 5, oblong to round, 2.5 cm. long

by 2.5 cm. wide, creped, apices retuse (shallowly notched), rounded to a short haft; stamens numerous, upright with incurved tips, filaments slender, light yellow; pistil shorter than the stamens, greenish, with 3 very short divisions at tip of style; ovary villous; leaves 7 to 9.5 cm. long by 2.5 to 3.5 cm. wide, elliptic, curved, almost flat, glossy on both surfaces, dark green above, lighter beneath, base slightly tapered, apices attenuate to a slender sharp point, finely serrulate.

8

NAMING CAMELLIA VARIETIES

LONG ago in the Orient, different kinds of camellias, particularly those derived from the species *C. japonica* and *C. Sasanqua*, were given varietal names. In 1712 Kæmpfer listed twenty-three sorts that he saw in Japan. So far as known now, these are the first camellia names, all Japanese, published in Europe.

Two varieties were brought to England in 1792 and became known as Alba Plena and Variegata. They were followed by others, the oriental names of which, if they had any (and they doubtless had), were dropped. They were given names in English or other European languages.

Some of the varieties introduced were capable of producing fruit and seeds. From their seeds, formed as a result of either natural or artificial pollination, varieties in large numbers were raised. Many were selected, named, propagated and distributed. Some were excellent; some were good; some were indifferent; others were inferior for one reason or another. Latin names for plants were the fashion, and camellia varieties quite generally were given Latin or Latinized names. Plain names in other languages were the exception. Berlèse in his "Monographie du Genre Camellia," 1837, recorded 281 varieties. By 1840 he had increased the list to 508, of which some were duplications. In 1849, in what was probably his final publication on the subject, he added 151 more, most of them originated in Italy. Between 1848 and 1860 the Verschaffelts published illustrations and descriptions of 623 camellias. Only a very few names in these lists are without Latin endings. Later on, Latin and

Latinized names for new varieties fell into disuse, and names taken from various other sources were given to varieties instead.

Some camellias such as Mathotiana, Lady Clare, Donckelari and C. M. Hovey were named for people; others, of which Gloire de Nantes, Virginica and Triumph of Philadelphia are examples, commemorated places. Still others were named because of real or fancied resemblances to other plants—Magnoliæflora, Dahliæflora and Pæoniæflora, for instance. Leaf forms, colors and descriptive terms also furnished names. Toward the end of the nineteenth century a few varieties originated in eastern Asia began to appear under oriental names in European lists and in the catalogues of Japanese nurseries published in English. Later the number of these varieties was greatly increased, and many of them were brought to America where the Japanese names have become part of camellia nomenclature.

Sources of camellia names

Confusion in the names of camellias began in Europe at an early date. Varieties were taken from one country to another, and in many cases they were renamed. Floyi, an American variety, became Grand Frederic in Germany; Marchioness of Exeter in England became Marquise d'Exeter in France. Chinese and Japanese names for varieties were dropped and others were substituted. The Japanese camellia Hikarugenji became Herme in Germany, Souvenir de Henri Guichard in France and Jordan's Pride on the West Coast of the United States. Camellias brought to England were given both Latin and English names for the same varieties. The situation became more and more involved as time went on and the number of varieties increased. In many cases the Latin word "vera" was added to a name to distinguish the true variety from another and often an inferior sort. Some-

Confusion in naming

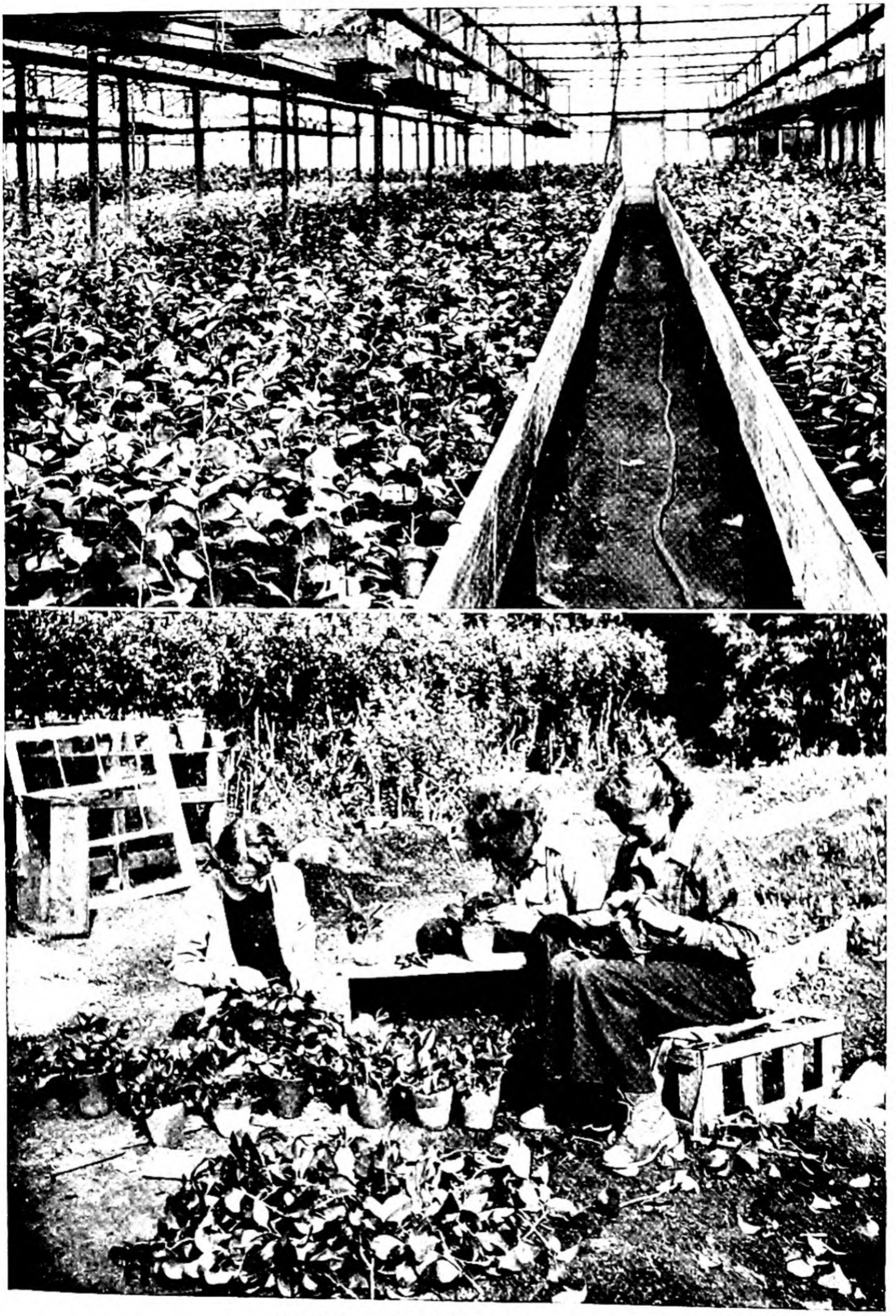
times the name of the originator of a variety was attached, because another poor variety had been given the same name. That is how the term Chandleri Elegans started. A poor variety was given the name Elegans by Baumann Brothers. The correct name for this variety as given by Chandler and Booth is simply Elegans, but the word "Chandler" was added to separate it from the Baumann variety.

Camellias originated in America

Camellia culture in America was started with plants brought in from Europe. These specimens came to greenhouses in or close to northern cities along the Atlantic coast and to a limited extent to the gardens of the South. Later the southern plantings were increased largely with plants from northern propagators. American growers inherited the confusion in names with the plants they imported.

Camellias in considerable numbers were originated in America by crossing, were named and propagated. The names of about 200 of these are known. Some were carefully described in American and European publications, but the descriptions of many are inadequate and some are known only by name, or little more than that. In some cases these names have been taken up and applied to varieties in recent years without sufficient information to establish their correctness.

When camellias fell from public favor as they did in the latter part of the nineteenth century and continuing some years into the twentieth, they disappeared almost completely from northern greenhouses, but being hardy plants they persisted in spite of neglect in southern gardens. Many of these were planted between 1840 and 1860. Moreover, there is no question that seedling specimens that had never bloomed, and in consequence were unnamed, were handled in the nursery trade. With the renaissance of camellia culture that



CAMELLIA PROPAGATION

Upper: Greenhouse filled with small potted plants at Semmes, Ala.
Lower: Making and handling small lots of cuttings, Caledonia, Guernsey



CAMELLIA CUSPIDATA AND C. SALUENENSIS FRUIT
Hon. Charles Williams beside a Cuspidata camellia at Caerhays Castle, Cornwall.
Saluen twig with fruit, 3/5 natural size



DAWN CAMELLIA
Flowers and specimen tree



CAMELLIA MALIFLORA



CAMELLIA JAPONICA. FINLANDIA





CAMELLIA JAPONICA, HISHI-KARAITO
Flowers and specimen in David C. Strother garden, Fort Valley, Ga.



CAMELLIA JAPONICA. LADY HUMES BLUSH



CAMELLIA JAPONICA. LADY VANSITTART





CAMELLIA JAPONICA, MAGNOLIEFLORA



CAMELLIA JAPONICA, MARCHIONESS OF EXETER



CAMELLIA JAPONICA, MARGARET WALKER



CAMELLIA JAPONICA. MATSUKASA



CAMELLIA SASANQUA, SETSUGEKKA



CAMELLIA SASANQUA, VERSICOLOR



CAMELLIA SASANQUA, WILLOW LEAF



CAMELLIA SASANQUA, SHINONOME

really started about 1920, propagators turned their attention to these old specimens as sources of materials for making cuttings and scions.

There is in existence in the United States today no camellia collection of any considerable size planted in those earlier days for which there are authentic name records. The plants remain; their tags, invoices and records of any and every sort covering them are gone. In several instances specimens of the same variety were planted in different parts of the South. Propagation was started at several widely separated points, and the plants produced from cuttings or by grafting were given different names. As examples of this, Aunt Jetty in Florida showed up to be Governor Mouton in Louisiana; Woodville Red in Mississippi has proved to be the same as Henry Bry in Louisiana, Robert Martin and Kollock in Georgia. And so it has come about that in several instances different names have been applied to the same camellia, and it is also true that several different sorts have come to carry the same name; Sarah Frost is an example. It followed then that those who purchased plants found out later that they had the same plant under several names and several different plants under the same name. Hence the advice "See a camellia in flower before buying it" was often given. Names could not be depended upon.

Camellia names lost

The same sort of thing happened in the naming of plants in other countries, and it was decided to do something about the disorder that had arisen. Consequently the problems and difficulties in the naming of horticultural varieties of plants were discussed at the Ninth International Horticultural Conference held in London in 1930. A code of nomenclature was agreed upon and was later published by the Royal Horticultural Society, London, 1930. There were

Code for naming horticultural varieties of plants

further discussions at conferences in Paris (1932) and Rome (1933), but few changes or additions were made and the code of 1930 remains essentially as adopted in that year. In certain particulars, this code is based on the rules and regulations formulated by botanists for the naming of plants generally. The salient points of the international code as stated in the original publication are as follows:

"The principles governing the naming of plants by botanists were accepted as the basis for the naming of plants of garden origin, these principles being:

"1. A plant can bear but one valid name.

"2. The valid name is the earliest which conforms to the Accepted Rules of Nomenclature.

"Plants raised in gardens as seedlings or sports of these species or as hybrids between species often have to be named by non-botanical people, and the following rules, . . . are for their guidance.

"(a) The name of a horticultural variety should be placed after that of the species to which it belongs, and its status should, or may, be indicated by the contraction 'var.'

"(b) The variety name should be of Latin form only when it expresses some character of the plant.

"The use of Latin proper names for horticultural varieties is not permissible.

"(c) The name will thus usually be a 'fancy' name, beginning with a capital letter.

"(d) Varietal names must not be translated when transferred from other languages, but must be preserved in the language in which they were originally described. Where desirable, a translation may be placed in brackets after the varietal name.

"(e) As far as possible, names of horticultural varieties should consist of a single word; the employment of not more than three words is permitted as a maximum.

"(1) A varietal name in use for one variety of a kind of plant should not be used again for

Code for naming horticultural varieties of plants continued

another variety of that kind, even though it may be attached to a different species.

"(2) Varietal names likely to be confused with one another should be avoided.

"(3) Where personal names are used to designate varieties, the prefixes 'Mr.,' 'Mrs.,' 'Miss,' and their equivalents should be avoided.

"(4) Excessively long words and words difficult to pronounce should be avoided in coining varietal names.

"(5) The articles 'a' and 'the' and their equivalents should be avoided in all languages when they do not form an integral part of a substantive.

"(6) Existing names in common use should not be altered to conform to these rules, but attention should be paid to them in all new names proposed.

"(k) In order to be valid, a name must be published.

"(l) The publication of a name of a horticultural variety or hybrid is effected by a recognizable description, with or without a figure, in any language written in Roman characters.

"(m) The description must appear in a recognized horticultural or botanical periodical, or in a monograph or other scientific publication, or in a dated horticultural catalogue.

"(n) The mention of a variety without description in a catalogue, or in the report of an exhibition, is not valid publication, even if a figure is given."

Several points in this code should be emphasized. These are: (1) a variety should have but one name, (2) this name should be the one first properly published, (3) other names become synonyms, (4) names once used should not be used again, (5) names must be preserved and not changed when taken from another language, (6) Latin or Latinized names should not be used for horticultural varieties.

Important points in horticultural code

If this code is followed by originators, introducers, nurserymen and growers, a great advance in the elimination of such confusion as still exists in camellia names will have been made. Unfortunately some appear to regard names as sacred things and resent any changes.

Errors and duplications in camellia names had much to do with the organization of the American Camellia Society, though its work has been extended far beyond the solution of problems of nomenclature, and rightly so. Already much has been done in establishing correct names, but much still remains to be done. Some years ago, a collection of camellia varieties and species was started by the Florida Agricultural Experiment Station at Gainesville. Included in its plantings are camellias from many sources, and these have been of untold help in working out the synonymy of varieties. Nurserymen have a vital place in solving these name difficulties. The great need is for them to join in the undertaking and to back the work of the American Camellia Society in bringing order out of confusion.

"In those cases where a variety is incorrectly named, no particular harm would be done were everyone agreed on the variety the name represents. This statement is not to be taken as condoning misnaming, for there is no substitute for correct, accurate naming of plants; but no particular harm or inconvenience would come about if a name incorrectly applied represented a single variety and were generally accepted. Were varieties commonly recognized by single names, the planter would be safeguarded against receiving two or more different varieties under the same name or purchasing the same variety under a number of different names. General widespread agreement on what a name actually represents is necessary."*

Need for uniformity of names

*Quoted from "Camellias in America."

9

PROPAGATING CAMELLIAS

AMATEUR camellia growers quite generally believe or have believed that camellias are hard to propagate, but in reality they are no more difficult than many other kinds of plants. While it is true that there are certain details to which special care and attention must be given, they may be increased in numbers without particular difficulty even under the conditions commonly found in gardens. By using much the same methods as in propagating plants of many other kinds, they may be multiplied from seeds, by cuttings and by grafting. When propagation of a considerable number of varieties belonging to a single group of plants is undertaken, it is often found that some of them are much easier to handle than others. This is true of camellias.

Methods of propagation

Seedlings are raised to supply stocks for grafting, to secure new varieties or forms, and to provide plants for making hedges and other garden uses where flowers are not the first consideration. For the most part, seeds ripen in September and October in sections north of the equator and in March and April in locations south of it. They should not be allowed to become dry and, therefore, it is best to plant them very soon after they are gathered. If it is necessary to hold them for some time, they can be kept in good viable condition by packing them in pulverized charcoal in tight containers. The amount of charcoal used should at least equal the bulk of seeds. There are considerable variations in time required for germination, but under favorable conditions the first root growth from good seeds will appear in six to eight weeks after planting.

Raising camellia seedlings

Other seeds out of any lot will require more time. They may be planted in pots, boxes or beds, all of which have advantages depending largely upon the number of seeds handled. For soil used in planting seeds, nothing is better than woods mold, free from rough material and containing a liberal amount of organic matter. A mixture of good garden soil, peat and coarse sand in equal parts is satisfactory. Whatever the soil is, it should be acid, with a reaction between pH 4.5 and 5.5. Seeds should be placed from one-half to one inch deep, and if in beds, they are planted much the same as garden beans. The soil is firmed over them and covered with a leaf mulch two or three inches deep. When germination starts and sprouts begin to appear above the soil surface, reduce the mulch to a depth of one inch. Pots in which seeds in small numbers are planted may be sunk in the ground and covered with mulch as a safeguard against drying out, but even with these precautions, it may be necessary at times to water them.

An excellent way to handle small lots of seed is to mix them with moist peat or pulverized sphagnum moss and put them in wide-mouthed glass bottles or jars. The amount of peat or moss should exceed the bulk of seed. The right amount of moisture can be obtained by wetting the peat or moss and then removing all the water possible by squeezing with the hands. From time to time seeds against the glass can be examined. When germination shows in numbers of them, a jar can be emptied and the sprouted seeds picked out and planted in pots or beds. Unsprouted seeds can be put back in the jar; many of them will germinate later. This method of handling makes it possible to germinate seeds in small space, and for the time they are in the jars affords excellent protection

against rats and squirrels. By whatever method they are handled, seedlings six or eight inches high can be raised in a season, and they are then ready for transplanting to be grown on for stocks or other uses.

At the end of the first season, camellia seedlings should be transferred to pots or lined out in specially prepared beds. For large numbers, beds in frames are preferable in colder sections, because they can be covered to protect small plants against freezing in winter. The soil used, whether in pots or in beds, should be enriched with goodly amounts of peat, well-decayed manure or other organic matter and small quantities of suitable fertilizer. In beds, rows eight inches or so apart are satisfactory, with plants spaced four to six inches in the rows. Before lining them out it is well to clip the tips of the tap roots to induce better root development. Here they can remain for another season, after which they are transplanted to nursery rows to be grown on for garden use or for use as stocks for grafting. The beds should be kept free of weeds and should receive water as needed and small amounts of fertilizer from time to time. If plants are grown in the hope of securing new varieties, it will be necessary to grow them for several seasons. Flowers are not to be expected in less than four or five years from time of planting; though occasionally a plant will bloom in less time, others may require ten years or more. Seedlings of *C. saluenensis* are very precocious; many of them will flower in two years.

Care of camellia seedlings

Nurserymen produce by far the greatest number of their camellia plants from cuttings. The method also is well adapted to the needs of amateur gardeners who in this way can increase their stocks of plants and at the same time take great satisfaction in saying, "I grew it from a cutting. It is a fine plant, isn't it?"

Growing camellias from cuttings

Equipment needed for making and growing cuttings consists of a pair of pruning shears, a knife, rooting medium, pots, boxes or beds and labels. The shears are used for taking cuttings from parent plants, the knife (which should have a keen edge) for making cuttings, a medium of some sort for rooting cuttings, and pots, boxes or beds to hold the medium. Many propagators handle cuttings in greenhouses, thereby making it possible to control heat, moisture and humidity, while others root cuttings in the shade of trees, in slat sheds or in beds covered with cloth. Clearly there is no best method of handling them.

Media for rooting cuttings

For a rooting medium any one of a number of different materials may be used. Among those most employed are peat, sand and vermiculite. At this time, coarse, sharp sand is much more extensively used than all others put together. It is essential that it be coarse and sharp, to provide good drainage and to allow air to enter. This sand is known in the building trade as plaster sand. It should be acid, with a pH of 4.5 to 5.5. If peat is mixed with sand, it is best not to have it more than one-quarter of the whole bulk. The sand should be firmly packed in the beds or containers. Vermiculite may be used alone or mixed with sand or peat. In any case it should not be packed tight in pot or bed. Much of its value lies in its ability to hold water and retain air, but if solidly packed down its air-holding capacity is reduced.

Plan for small lots of cuttings

Here is a simple plan for rooting cuttings in small numbers in the garden. Select a well-drained place. In it dig holes eight to ten inches deep, with straight, smooth sides and flat bottoms. If the soil is light (sandy), thorough watering will help to hold it in place while the holes are being dug. Fill the holes with the rooting medium. Place the cuttings in this medium in the

usual manner and cover with cloches that correspond in size and shape to the holes. Excellent box cloches can be made with five panes of window glass set in narrow frames, four of them fastened together for the sides of the box and the fifth one to cover it. These make miniature greenhouses where cuttings can be shaded, watered, syringed and in due time rooted.

Growing camellias from cuttings

In handling small lots of a number of different varieties of camellia cuttings, there is always danger of their becoming mixed. A good plan is to fill six-inch pots with the rooting medium, place the cuttings in these (each lot in a separate pot) and then plunge the pots in a bed. The small lots of cuttings, properly labeled, are thus kept separate from one another and danger of mixing them is reduced greatly. It is recommended that the cuttings be placed around and against the insides of the pots.

It is essential that the rooting medium be kept moist during all the time the cuttings are in it. If sand is used, water must be given frequently. Sand and peat mixed will require less water, and vermiculite will need but little. It is wise, whatever the medium, to make sure that the drainage is good. If elevated beds or boxes are used, there must be openings in sufficient size and number to allow the passage of surplus water quickly. Drainage material, consisting of broken pots, gravel or crushed rock, to a depth of about two inches is necessary in the bottom. In making beds on the ground, careful attention must be given to drainage. It is much easier to maintain suitable moisture conditions in beds of some depth than it is in shallow ones. Rooting media eight inches in depth, therefore, are recommended.

Watering requires careful attention

While cuttings can be made at any time when twigs not in growth are available, both experience

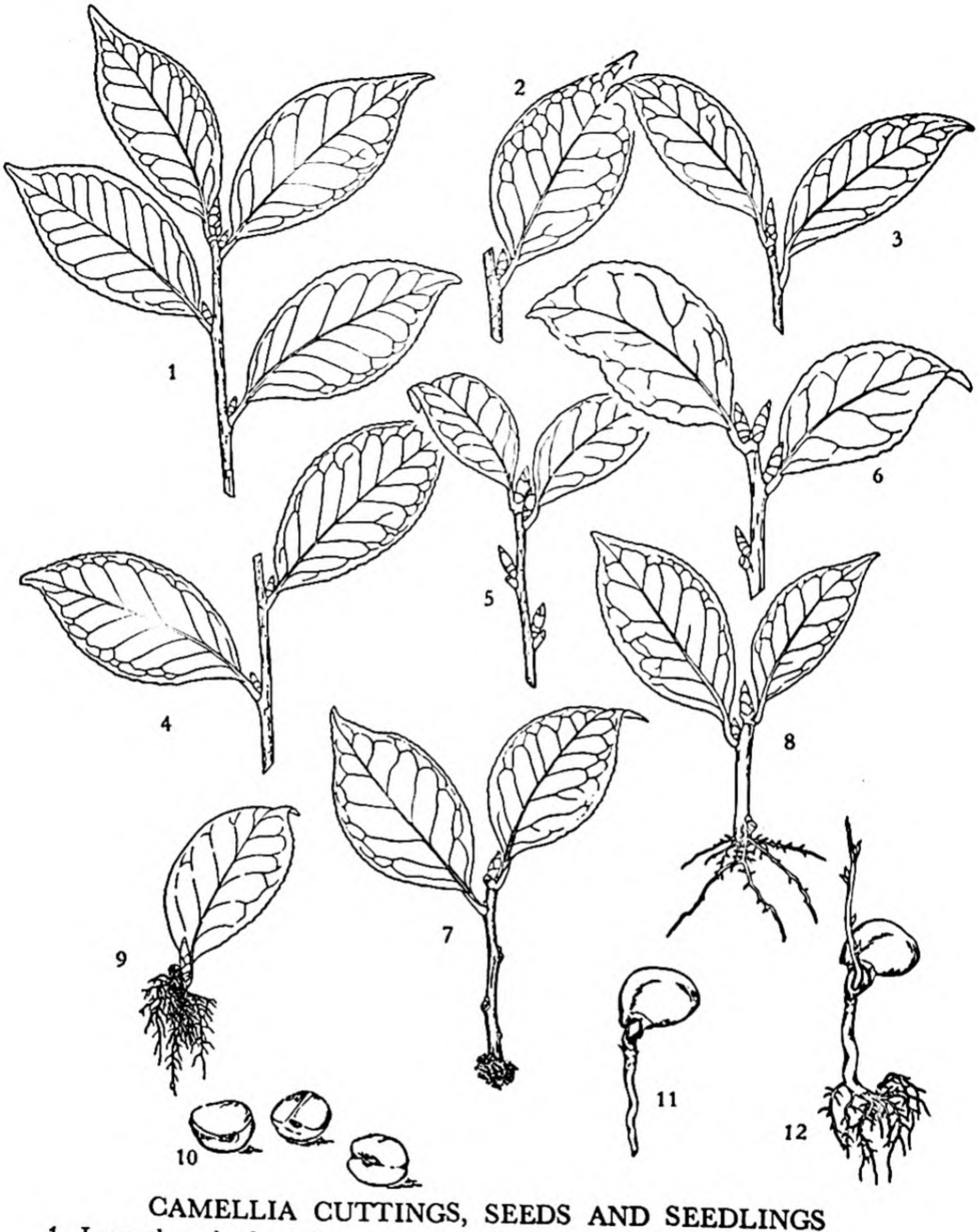
and experiments have shown that the best time to make cuttings is when the shoots that started in the spring are well grown, with well-developed shoot buds, and have changed in color from green to light brown. The optimum time is late July and early August in the northern hemisphere or during the corresponding period south of the equator. Satisfactory results have been secured with *C. Sasanqua* cuttings taken in January and early February. Plants can be grown from root cuttings one-fourth to one-half inch in diameter and three to four inches long, made in winter and handled in the usual manner.

Time for making cuttings

That cuttings may be furnished with well-developed shoot buds, tips of twigs or branches are selected from trees in vigorous, healthy growth. Good growth and vigor in the plants from which the cuttings are taken have much to do with successful rooting. They must be well matured, not soft and succulent. When the cuttings are taken from the parent plant, they should be kept moist by wrapping them in damp paper or burlap to prevent loss of moisture until they are placed in the rooting medium. At no time should they be allowed to dry out and, indeed, it is a wise provision, if the plants from which cuttings are to be taken are dry, to water them two or three days before twigs are cut from them so that they may contain their full quota of moisture. Usually it is difficult to get suitable cuttings from an old specimen, but often careful search of the top will result in finding a vigorous sprout from which one or more cuttings may be secured.

Selecting cuttings

Twigs with one to five good shoot buds make satisfactory cuttings; three buds is the usual number. For the most part, tips of twigs only are used, but often one or more may be made below the first cutting if good shoot buds are present. Sometimes what are



CAMELLIA CUTTINGS, SEEDS AND SEEDLINGS

1. Long three-bud cutting
2. Single lateral-bud cutting
3. Single terminal-bud cutting
4. Two-bud cutting
5. Four-bud cutting
6. Three-bud cutting
7. Roots starting on cutting
8. Well-rooted cutting
9. Single-bud cutting rooted
10. Seeds
11. Germination starting
12. Germination showing shoots and roots

Size of cuttings

called "leaf-bud cuttings" are used. These are cut as though making a shield bud with leaf attached, but they do not appear to have any advantage over ordinary single bud cuttings made in the usual manner. The essential thing is to have a well-developed shoot bud at the base of the leaf.

One leaf is left on a one-bud or two-bud cutting, two on a three-bud cutting and two or three on a four- or five-bud cutting. More than these, if present, are removed by cutting them off with a knife or stripping them off with the fingers. It does not matter whether the lower end of the cutting is just below a bud or whether it is cut off part way between two buds. Cuttings will vary in length from one to four or five inches, depending upon the number of buds on them and the length of the internodes.

Placing cuttings in media

Sand should be wet down and packed before the cuttings are inserted. Vermiculite should not be packed, but only pressed down lightly. The medium is opened for the cuttings by drawing a stiff thick knife blade through it, along a straight edge. The cuttings are dipped in Hormodin No. 3, the excess tapped off on the edge of the can, and the cuttings are then shoved down gently but firmly into the medium until the bottom leaves are resting on it. Long cuttings should be inserted at an angle so that their ends will be about two and one-half inches below the surface. The medium should be packed firmly against them after each row of cuttings is in place. A square foot of cutting bed surface will accommodate about twenty-five cuttings.

Space required for cuttings

The after-care of cuttings in rooting media consists of providing some shade if necessary and paying careful attention to syringing and watering.

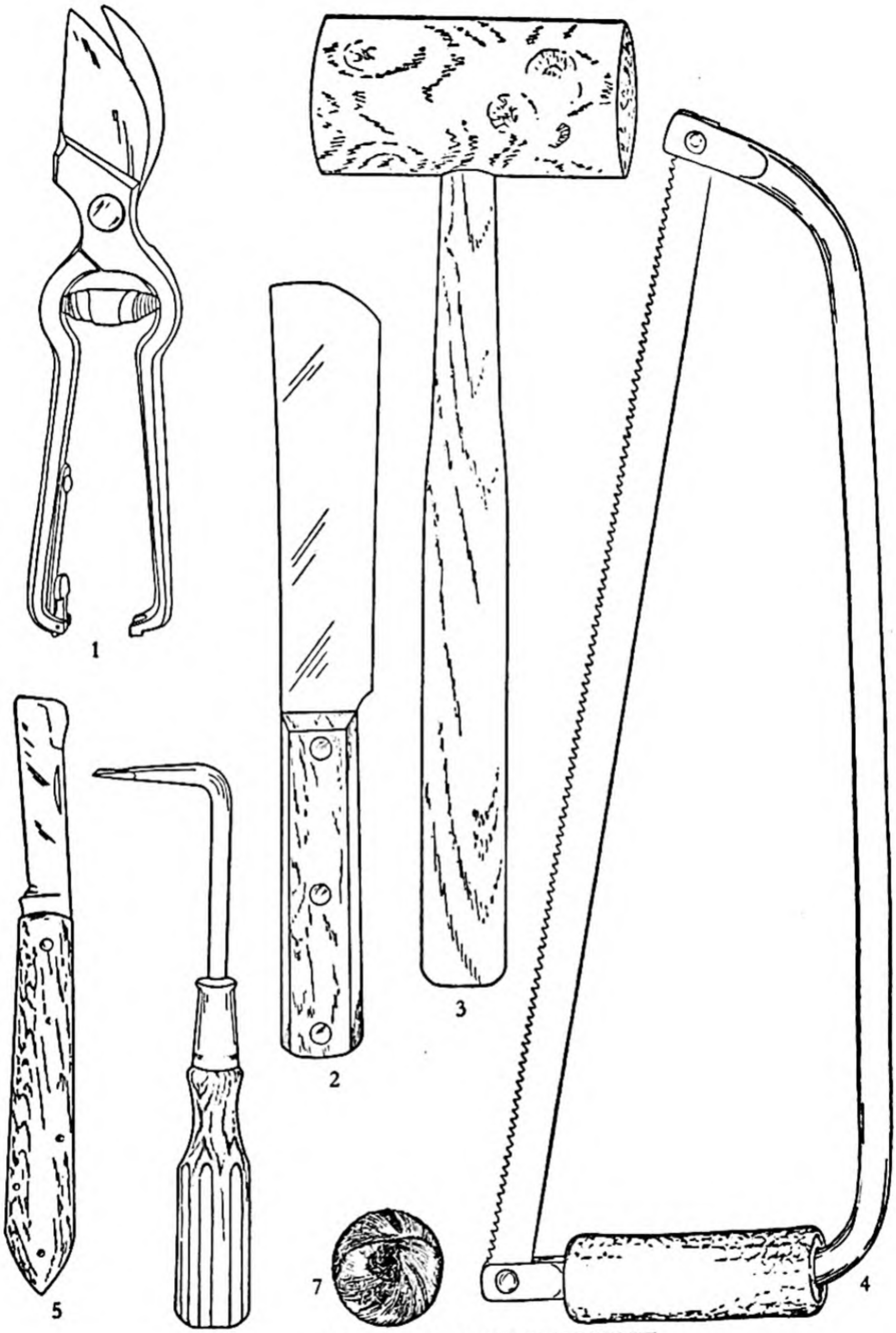
Cuttings inserted in July will often be rooted by November. They may then be potted off or lined out

in prepared beds, or they may be held in the rooting medium until March. During the following summer, whether they have been transferred to pots or to beds, they require strict attention to watering and syringing. Very light applications of suitable fertilizer may be given as soon as root growth becomes active after transplanting, a condition that may be determined by lifting a plant now and then to determine the condition of root development.

Grafting seasons

Two seasons are satisfactory for grafting. The one most frequently chosen is late winter or early spring; the other is late summer. Better results are secured from grafting three or four weeks before sap begins to move in spring than at any other season. The cambium is most active when growth starts following winter dormancy, and grafting done in advance of that period is likely to be followed by better growth. Under open-ground conditions in some sections, summer grafting may not be satisfactory, because some growth may start from scions inserted at that time and this growth does not become sufficiently hardened to withstand the cold of winter. Grafting by the usual methods at any season when there is very free sap movement in stock or scion, is not likely to prove satisfactory. Success in grafting depends upon the correct condition of both the scion and the stock, proper selection of the materials used, skill exercised in making unions and care given the grafts after the work has been completed.

Little is known about the relative merits of various kinds of stocks used in grafting, and many questions that may be asked on this subject cannot be answered definitely. Can as good results be secured by grafting Japonica varieties on Sasanqua stocks as on Japonica varieties, and vice versa? What is the effect of various



GRAFTING EQUIPMENT

(1) Shears, (2) Knife for splitting, (3) Mallet, (4) Saw, (5) Knife for scions and small stocks, (6) Right-angle screwdriver, (7) Waxed wrapping twine.

stocks on growth, flowering and length of life? Such questions, for the present, must remain unanswered.

Complete equipment for grafting camellia stocks of all sizes includes pruning shears, a fine-toothed saw, a grafting knife with thin flat blade and keen edge for shaping scions, a grafting iron or knife, a small wooden mallet, a wedge for holding the cleft open in cleft-grafting, waxed twine if small stocks are used, and cloches. For small stocks (those under a half-inch in diameter), pruning shears, grafting knife, waxed twine and cloches are all that is needed. A heavy butcher knife with the blade cut back to six inches makes an excellent grafting iron or knife for heavy grafting. A useful wedge can be made by bending the shank of a screwdriver at an angle of 45°. Satisfactory cloches are bottles or jars with wide mouths, such as quart-size canning jars, discarded glass battery jars and bottles of suitable size with the bottoms cut off. Waxed twine is made by boiling small balls of No. 18 knitting cotton in melted grafting wax until the wax has penetrated them completely. Cleft-grafting is the method most commonly used, although the whip-graft and splice-graft are satisfactory for small stocks. Crown-bark grafting is suitable for summer propagation or for a season when the bark separates readily from the wood. Inarching or grafting by approach is sometimes used for camellias that are difficult to propagate by other grafting methods.

Grafting equipment

Stocks used for grafting may be grown from seeds or from cuttings. If the latter are used, they should be taken from strong, vigorous-growing varieties, for two reasons: (1) they will require less time to reach suitable size for grafting, and (2) vigorous stocks will impart something of their vigor to the variety grafted on them. Too little attention has been given to the

kinds of stocks used in grafting. In many cases they are a mixture of several varieties with variations in vigor and rate of growth. Propagators are well advised to select suitable varieties for use as stocks. In the long run more satisfactory results and greater uniformity in grafted plants will be secured. The use of small stocks of three-eighths inch or so in open-ground work is not advisable. Much quicker and better results are secured by first growing good stocks, with a diameter of one-half inch or more, and then grafting them. It is very difficult to grow plants satisfactorily when the development of both stock and scion to larger sizes is involved at the same time. One scion may be set in a stock one-half to three-fourths inch in diameter, two in a one- to one-and-one-half-inch stock, four in one that is two to three and one-half inches across and as many as six in a four-inch stock.

Camellia stocks

Scions used in grafting are much the same as the wood used for making cuttings, though usually they are shorter than the longer cuttings. Generally two leaves are left on them. They are prepared for cleft-grafting by shaping them to a wedge about one inch long at the lower end and leaving them a little thicker on one side than the other. The cut should be smooth and straight. After the stock is cut off at the desired height, just a little above the ground, it is split to a depth of about one and one-half inches with a grafting iron by tapping it gently with the mallet and is opened with the wedge to permit insertion of the scion. The bent screwdriver is very handy, because by pressing down on the handle the cleft can be opened just the right distance to permit easy insertion of the scion, and at the same time the handle is out of the way. The scion must be carefully placed in position wit' the cambium layers (just beneath the bark) of stock and

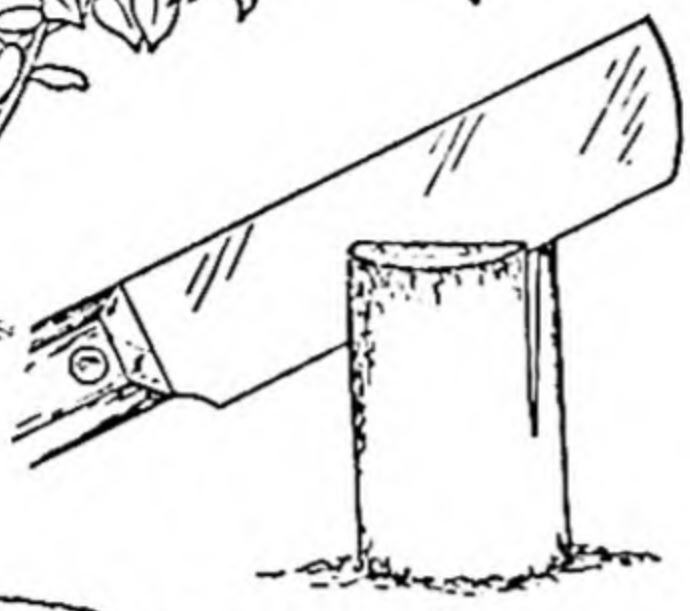
Scions



CAMELLIA SASANQUA, HEBE



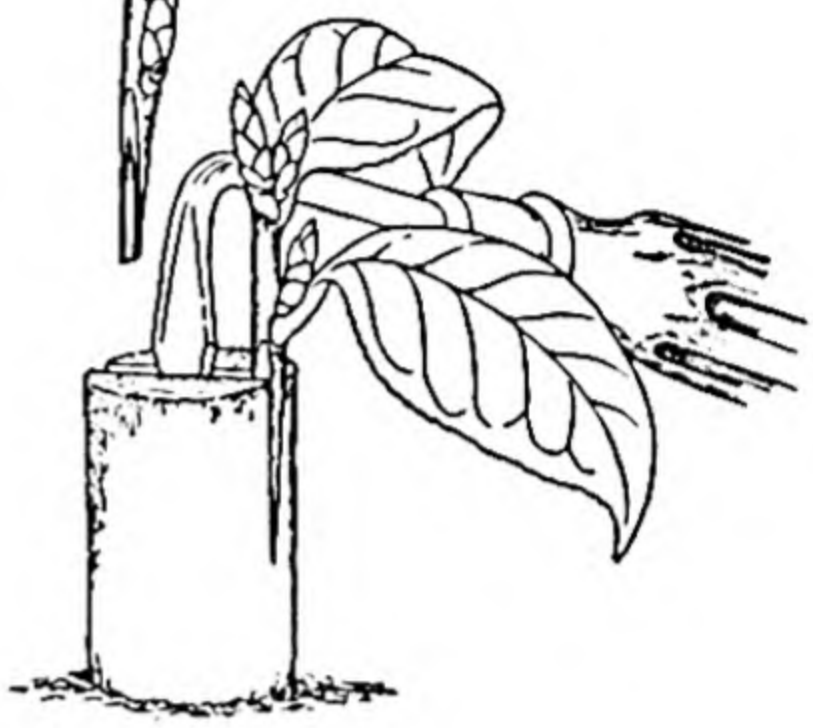
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GRAFTING

Cleft-Grafting

1. Stock before cutting off
2. Splitting the stock
3. Scion prepared for insertion
4. Scion in place, cleft held open for second sci

Side-Grafting

5. Stock and scion prepared
6. Scion placed and wrapped with waxed twine

Crown-Bark Grafting

7. Scion
8. One scion in place befo. wrapping
9. Bark prepared for second scion

scion in contact, leaving a small portion of the cut surface on the sides of the scion above the top of the stock. Good contact is most necessary. Some grafters slant the scion inward very slightly.

Cleft-grafting procedure

Scions inserted in stocks one-half inch and over in diameter need not be tied or wrapped with waxed twine, because sufficient pressure is exerted by the split stock to hold them firmly in place; but if smaller stocks are used, the stock should be wrapped to hold the scion in place until united. The twine should not be left in place too long, for it will cut into the bark of the expanding stock and scion. Pressure can be relieved when necessary by cutting carefully through the twine with a sharp knife at a point opposite to or away from the place where the scion was inserted in the stock.

After insertion of the scion or scions, clean earth is heaped over the top of the stock and around the scions up to the base of the leaves and snugly packed in place. Some propagators use a small quantity of sphagnum moss over the stock and about the base of the scion before covering with soil, and clean sand is sometimes used instead of soil. Keeping the soil or sand in place can be facilitated by placing a tin can of suitable size, with both top and bottom removed, around the graft and packing it with soil to the right depth. When this operation is completed, a cloche is placed over the graft to afford protection and to maintain a humid air condition about the grafted plant. The cloche is shaded on the top and south side with burlap, Spanish moss, paper or other suitable covering that will exclude sunlight, and prevent burning of the leaves of the scion. Light admitted on the side away from the sunlight is beneficial in maintaining activity in the chlorophyll of the leaves. In due time,

After-care of grafts

if the union is successful, shoot buds on the scion swell and new shoots start. When these are grown out two or three inches, air should be admitted by propping the cloche up a little from the ground on one side. After a few days it can be removed entirely. If the weather is cloudy, so much the better; if not, it may be wise to provide a little shade with a wooden shingle or thin slat shoved down into the soil on the side from which the sun shines.

Rapid growth from the scions should be supported by an adequate amount of moisture in the soil. Watering may be overdone, but on the other hand, the earth about the root system of the stock should not be allowed to dry out.

Usually a growth of one and one-half to two feet is secured from a graft in the first season, but it may reach as much as three or four feet or even more. Where growth is rapid, it is best to protect it from being broken off by setting a stake close to it and tying the graft to it; or three or four stakes can be set around a graft and a band of wire screen fastened around them.

Growth of grafted plants

Since it is difficult to work small stocks three-eighths inch or somewhat less in diameter by the cleft method, it is best to use the splice-graft for them. This method is well adapted for grafting stocks grown in pots, and the work may be done in a greenhouse or in a frame. If only a few are to be grafted, they may be handled by simply setting the pots on a greenhouse bench after grafting the stocks in them, packing damp sphagnum moss around them, much as earth is used in cleft-grafting out-of-doors, and covering them with cloches. If considerable numbers are to be grafted, it is best to use a closed frame in a greenhouse or in the open. In an outside frame, it is advisable to furnish heat by means of an electric cable. Pots containing plants

just grafted may be laid on their sides in the frame and covered with moss, leaving only the leaves of the scions exposed, there to remain until union has taken place.

Splice-grafts

A splice-graft, one of the simplest, is made by cutting the stock off with a sloping cut, one and one-fourth inches long. The scion is prepared with a corresponding sloping cut. The cut surfaces on the stock and scion should be of the same length. Stock and scion should be the same size, or nearly the same. The cut surfaces of stock and scion are placed together with the cambium layers in contact along one side, preferably two sides, and firmly wrapped with waxed twine.

When it is desirable to replace a camellia already growing in a garden with a more satisfactory or better variety, it often can be done by grafting, even though the specimen has reached considerable size. Trunks three or four inches or more in diameter can be grafted successfully at the ground in the usual manner, using the cleft method. It is best to use four or even six scions, depending upon the size of the trunk, the stock being split off center in two or three places about one-half inch in from the circumference. Since there is likelihood of the trunk decaying, it is best to cover the cut surface with wax when the grafting is done. Another plan for replacing tops on camellias is to place a box around the trunk, high enough to reach the branches, and fill it with earth on which cloches can be placed. Branches are cut off close to the level of the soil in the box and cleft-grafted in the usual manner. This plan makes it possible to insert scions in smaller parts of the branches well above the ground, and something of the original size and shape can be secured quickly. If so desired, a number of different varieties may be used.

Grafting large plants

Camellias can be grafted by crown-grafting at any

time when the bark will separate readily from the wood and suitable scions are available. The best time will vary with location and growth conditions. Usually late June and early July will be found satisfactory.

Crown-grafting

Scions are selected from growth of the current season. They must be firm and well matured and should be of the same size and general character as those used in other methods of grafting. For insertion, the base of a scion is cut with a sloping cut about one and one-fourth inches long, on one side only, as in preparing a scion for splice-grafting. The sharp point of the scion is cut back a little on the opposite side to make insertion easier.

A stock is cut off close to the ground in the usual manner. By some a sloping cut is preferred, but if a number of scions are to be set on a single stock, it is best to cut it squarely across. The edges are then smoothed with a sharp knife. At a point where a scion is to be inserted, a slit is cut in a straight line downward just through the bark and the bark is lifted gently along its edges with a knife. This must be done very carefully because camellia bark is very thin and easily broken. The scion is then inserted between the bark and the wood and shoved downward into place. It is tied firmly by wrapping the stock with waxed twine. Around a stock of some size several scions may be placed, the number depending upon its diameter. The stock with its scion or scions is then covered and handled in the same manner as in cleft-grafting. If scions with shoot buds fairly well developed are selected, growth usually will start before autumn, but in some cases a scion may remain dormant until growth begins the following spring. Sometimes the growth that starts in late summer or early autumn is not sufficiently hardened to withstand winter temperatures in some localities

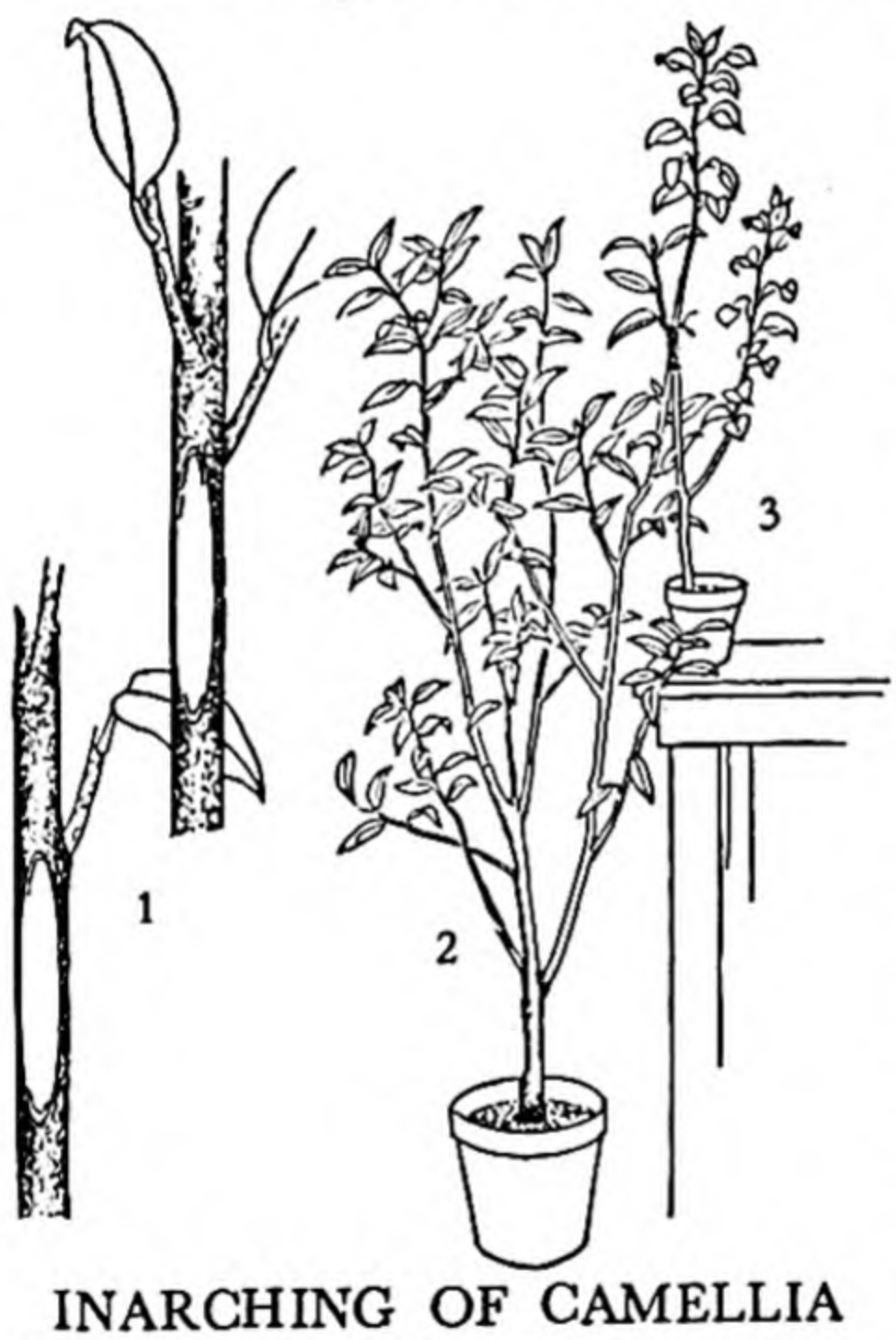
Crown-grafting method

out-of-doors. In such places it should be protected by covering when necessary.

Cuttings of some kinds of camellias do not form roots readily. This is particularly true of *C. reticulata*, which in the United States is commonly propagated by cleft-grafting on *C. japonica* and *C. Sasanqua* stocks. But propagators in England, Australia and other parts of the camellia world usually resort to inarching or grafting by approach to increase their stocks of this species and its varieties, as well as some others.

Inarching differs from other kinds of grafting in that the scion is still attached to the parent plant and is not separated from it until union with the stock is complete. Both stock and scion are still growing on their own roots when union takes place. Stocks of small diameters are grown in pots. Usually they are about one-fourth inch in diameter, and it is best that the shoots with which they are to be united should be of the same diameter. Parent plants used to supply scions should be small, with branches close to the ground, or it will be necessary to erect a stage on which the potted stocks can be set. At a proper place on the stock a slice about one and three-fourths inches long is

Inarching



INARCHING OF CAMELLIA

(1) Cut surfaces on stock and scion parts
(2) Scion plant
(3) Stock plant with point of union above

cut about halfway through it. A similar cut is made on the scion. The two cuts are fitted together with the cambium layers in contact wrapped firmly with raffia, grafting twine or tape and then covered with grafting wax. It is well to remember that both stock and scion must be so firmly fixed in place that they cannot be moved about by the wind. If inarching is done out-of-doors, it is best to fasten the scion or stock to a stake; and if a stake is used, the pot containing the stock should be firmly tied to it. The best time to inarch is late July and early August, the same season that is best for making cuttings. About six months after inarching, the top of the stock should be cut back part way, and twelve months will be required to secure a good, firm union. The top of the stock is then cut away above the union, and the scion is severed from the parent plant just below the union. This results in placing the branch or twig on the stock as a new top to make an independent plant.

10

SOILS AND SOIL FERTILITY

FOR MANY years camellias have been growing in gardens in different parts of the extended camellia belt. For several reasons care given most of them through the years has been very scanty or lacking entirely, and few old plants have had continuous attention since they were set out. Even though they were carefully planted, with good soil and fertilizer placed about their roots, their root systems long since grew out beyond the holes in which they were set. Their roots have grown and foraged in native soils and almost entirely from them secured nutrients necessary for growth and flowering. This goes to show that soils of different kinds are adapted to their needs, else they could not have grown and succeeded as they have. While this is true, it must be recognized at the same time that such specimens as were not planted in suitable surroundings have disappeared.

Soils of many kinds adapted

That camellias in wide variety can be grown on soils of different kinds is attested further by their successful culture in gardens in widely separated parts of the country. The soils of Florida are not those of Oregon, nor are those of Louisiana the same as those found in South Carolina; yet camellias are grown successfully in parts of all of them. They are found growing in soils of many different kinds. Fortunately soils can be improved or made to order before planting, and in most cases the work is well repaid. More improvement can be done before planting than afterward. Regardless of the kind of soil, the essentials, whether present naturally or provided artificially, are adequate drainage, acid reaction, fertility and sufficient moisture.

Soils in which camellias are grown fall naturally into three main groups: (1) sandy, (2) clay, and (3) loam. Each of these has some particular advantages, but no one of them has a monopoly of all desirable features, and good drainage and organic material will help all of them.

Sandy soils

Sandy soils are made up of large particles. They are easily handled at all times, drain readily, warm up quickly after cold weather and are well aërated. They are deficient in plant food, and what is applied leaches readily. Since they part easily with moisture, careful attention to watering is necessary during dry weather. They can be improved and made more suitable by mixing clay with them. Clay in which some sand is present naturally is more easily broken up and worked than pure clay. Organic materials also will improve the mechanical condition of sandy soil, and they, usually in the form of vegetable matter such as compost or peat, are easier to secure.

Clay soils

Clay soils are composed of fine particles, pasty and sticky when wet, hard and compact when dry. They do not admit water readily and when saturated do not drain easily. They contain more mineral substances and other plant nutrients than sandy soils. Their condition can be improved by adding sand to change their hard compact nature and to aërate them. Sand or clay used for mixing with soils for their improvement is best taken from surface layers. Organic matter also is helpful in breaking up their close compact makeup. Sufficient sand and organic matter should be added so that when wet and squeezed in the hand the soil will crumble and fall apart readily when pressure is released.

Loamy soils are those in which sand and clay are mixed. They are quite common, though the proportions of sand and clay may vary considerably. They

Loam soils

combine the good features of both sandy and clay soils, while the drawbacks of both are reduced. It may be advisable to improve their drainage and increase the proportion of sand or clay in them, but most important is the addition of vegetable matter.

Value of organic matter

Suitable organic material, so important an ingredient of camellia soils, can be secured from a number of different sources. Peat may be purchased (fortunately there are acid local peats in many areas), muck can be had from the margins of ponds, and compost formed of various kinds of plant refuse can be made to supply materials needed for soil improvement. The high value of farm manures should not be overlooked. These materials when mixed in the soil increase its water-holding capacity, improve its texture and add plant food. Whatever the substances used, they should be acid; lime must be avoided. It must be kept in mind that sand and clay are stable materials that do not disappear except by erosion, while humus or vegetable matter decays, breaks down into original substances and disappears. It must be renewed or replaced from time to time.

Soil reaction

Soils may be acid, neutral or alkaline in reaction. Chemists measure soil reaction, commonly referred to as the pH, on a scale graduated from 0 to 14. On this scale 7 is the neutral point. From this point downward they are classified as acid, while above 7 they are alkaline. It has been found that a satisfactory soil reaction for camellias is pH 4.5 to 6.5. Under usual cultural conditions it is well to maintain the reaction within these limits, and above pH 6.5 is inadvisable, though sometimes tolerated.

The reaction of a soil can be lowered by adding naturally acid soil to it. When this is to be done, it is best to dig out and remove some or all of the original,

then add acid soil or peat, partly decayed leaves or well-decayed cow manure mixed with top soil to bring the area that has been dug out back to the desired level. Peat and partly rotten oak leaves last well, and they can both be used liberally. To make alkaline soils usable, it is necessary to take away eighteen to twenty-four inches of soil, dust the bottom and sides of the hole or bed liberally with sulphur, and replace with a good acid soil mixture to which aluminum sulphate has been added. If the alkaline soil condition is difficult to overcome, the bottoms and sides of holes and beds in addition to being sulphurized can be covered or walled up with porous brick laid without mortar and the hole so lined filled with acid soil. From time to time after the plants have been set in such locations, the soil reaction should be checked to make certain it is still acid.

Changing soil reaction

Fortunately it is possible to change the reaction of the soil. When a lower pH is desired, it can be secured through the use of aluminum sulphate and sulphur. The former is quite rapid in its effects, and results can be obtained even in so short a time as two or three weeks. Sulphur is slower in its action, but it is effective over a much longer period and less amounts are needed to get desired results than are required for aluminum sulphate. In those cases where large amounts of this material to bring the soil reaction down to the proper level are used, it is best to make several applications at intervals in smaller amounts, in the meanwhile checking effects from time to time.

Using aluminum sulphate and sulphur

Laurie and Ries* have provided a table showing the amounts of sulphur and aluminum sulphate necessary to lower soil reaction in different degrees over an area of 100 square feet.

*Alex Laurie and Victor H. Ries, "Floriculture," p. 374.

Change from pH	Sulphur, lb.	Aluminum sulphate, lb.
8.0 to 7.0	2.0	4.5
8.0 to 6.5	3.0	7.0
8.0 to 6.0	4.0	10.0
8.0 to 5.5	5.5	13.5
8.0 to 5.0	7.0	17.5
7.5 to 7.0	1.75	3.5
7.5 to 6.5	2.0	5.0
7.5 to 6.0	3.5	7.5
7.5 to 5.5	5.0	11.5
7.5 to 5.0	6.5	15.5
7.0 to 6.5	1.5	2.5
7.0 to 6.0	2.0	5.5
7.0 to 5.5	3.5	9.0
7.0 to 5.0	5.0	13.0
6.5 to 6.0	1.5	3.0
6.5 to 5.5	2.5	6.5
6.5 to 5.0	4.0	10.5
6.0 to 5.5	1.5	3.5
6.0 to 5.0	3.0	7.5
5.5 to 5.0	1.5	4.0

It may be that aluminum is helpful in the growth of camellias, and in addition to lowering soil reaction it may actually have value as a fertilizer.

Maintaining organic material

The incorporation of organic matter in the soil in goodly amounts and its maintenance there from year to year is really part of a fertilizing program. It differs from the mineral content (sand, clay or silt) in its poor lasting qualities. Mineral matter in the garden is subject to relatively little variation, but organic matter, whether it be peat, manure or compost, is subject to change. It is being broken down continually, and unless renewed, it disappears completely. This is particularly true in those areas where camellias are grown. There, the changes are so rapid that there

are little or no visible remains of organic matter left after the lapse of twelve months from the time of its incorporation in the soil. And since it is so essential, it should be replaced frequently. After camellias are established and their roots have taken possession of the soil, the best way to maintain organic matter in sufficient amounts is by mulching. Only at planting time can organic substances be put into and thoroughly mixed with the soil for direct contact with the roots, but later on they can be added by plugging or by mulching. In these three ways, the beneficial effects of vegetable matter can be obtained and maintained. Organic matter should always be added at planting time, but after that the easiest way to continue its values is by maintaining a mulch. The particular source of organic matter and mulching material—and there are many suitable sources—depends largely upon what is available in different localities. Peat is very commonly used because it is handled in the nursery and plant trade, but there are a number of other good materials, and well-decayed farm manures should not be overlooked.

11

PLANTING CAMELLIAS

ALWAYS in moving plants from one location to another and establishing them again, some risk of loss is involved. Since camellias are of unusual value, every precaution should be taken to have them grow off promptly and to limit losses to the lowest possible minimum. At time of planting, much may be done for the future welfare of the plants that cannot be done so well at any later time.

To insure success in transplanting and satisfactory growth thereafter, certain details must receive attention. Unless the work is done carefully, plants may not start into growth readily or they may not start at all. Particular care must be given them from the time they are taken out of containers or the open soil in which they were grown until they are established in their new location. It is essential during this time that they do not lose moisture, and to prevent loss they must be protected from sun and wind and kept moist. Planting must be well and carefully done; good soil should be used liberally and some fertilizer added. Afterward careful attention must be given until they are established. Their moisture content must be maintained at a high level until growth starts in their new location.

Care of plants at time of planting

There has been and there still is confusion in the naming of camellias. Some varieties have been given more than one name, and in several instances the same name has been applied to more than one variety. Fortunately, the names of a considerable number appear to be fixed and quite generally in use. To be sure of securing the variety desired, many prefer to

visit nurseries when camellias are in flower and to select the specimens for their plantings. This does away with the difficulties of mistaken identities.

Camellias vary greatly in price according to size as well as variety. Some are much more difficult to propagate than others and for that reason command higher prices. Varieties recently introduced also are more expensive because they are in short supply, and this may be true of desirable varieties generally at times.

Purchasing plants

A question often asked is, "Which is better—a grafted plant or one on its own roots?" There are several answers to this question. Usually for the same size top, in the smaller sizes, the grafted plant will have a better-developed root system because it is older and, therefore, as soon as established the plant will grow faster. Large numbers of camellias on their own roots have been planted throughout the United States and have proved satisfactory. If the root systems for several varieties are all the same, it might be expected that growth would be more uniform; but even conceding that the stock is half the plant, it does not follow that all varieties grafted thereon will be equally satisfactory in growth.

Grafted versus own-root plants

All things considered, small, but not too small, plants are easiest to transplant. Larger ones are more difficult, and in handling them greater care must be exercised. Well-grown, well-branched plants eighteen to twenty-four inches tall are very desirable, but, of course, where immediate effects are wanted, larger ones should be used. Plants are produced and handled in two different ways. They are grown either in open-ground beds or nursery rows, or in pots or containers of some sort. Those raised in open ground may be transplanted with bare roots, but unless quite small they are nearly always balled and burlapped (B & B).

Those grown in containers are taken out of them and planted just as B & B plants are.

Camellias in greater numbers by far are transplanted during the winter dormant season, that is, between November and March, than at any other time in northern climates. In some sections the season toward the end of the winter period is dry, and in such areas it is advisable to plant early, even before the first of the year. This gives time for roots to callus at the ends where they have been cut off and for new roots to start before dry weather sets in. Plants are then in much better condition to pass through periods of dry weather.

Transplanting time

The best planting time is the dormant season in winter; the poorest is when the plants are shoving out their new growth in spring and while this growth is still soft. The latter time is to be avoided because chances of success are reduced, and even though successful the plants are likely to get off to a poor start.

When plants are received in any one of the different ways by which they are transported, they should be unpacked, placed in a shaded spot, syringed and watered. If there are several of them, they can be set close together in shade with their balls of earth covered with soil or peat. Handled in this manner, they can be held for some time in good condition.

Soil for planting

Prepared soil for use in planting should be provided. The exact makeup will depend upon materials available, but it is important that it contain organic matter. This may be peat, compost, decayed leaves or well-rotted manure. A satisfactory one can be made with equal parts of good soil, organic matter and woods mold. To this mixture, commercial camellia fertilizer may be added at the rate of a six-inch potful (about one quart) to a wheelbarrowful of soil,



CAMELLIA SASANQUA, HINODE-GUMO

and mixed thoroughly. Coarse sand may be added to make it more open and friable. It should be acid, with a reaction of approximately pH 5.

Transplanting with bare roots

Transplanting small plants with bare roots, those with single stems a foot or so in height, is attended with little risk. If grown in soil well supplied with organic matter, a small amount will remain attached to the root systems, and this is helpful. They must be carefully handled (packed in damp sphagnum moss or peat or sawdust) until they are put back in the earth again. Attention to shading, watering and syringing will help to insure success.

Handling large plants

As plants increase in size, however, risk of injury or loss in transplanting with bare roots increases, and this method should not be followed with large specimens except in those rare cases where there is no other way of handling them. If a plant of size must be moved with bare roots, it should be well watered before digging if the weather is dry, so that its cells may be filled to capacity, dug with as ample roots as possible, kept moist, well protected from sun and wind during moving, and pruned severely, even to stubs.

As soon as planting is done, wrapping the trunks and branches that have been cut back to stubs with wet excelsior, Spanish moss, burlap or similar material well tied in place will reduce loss of moisture. This covering should be kept moist until buds begin to shove out. It can then be removed, but the stubs should be shaded to prevent sunburn until new branches with their leaves have grown sufficiently to provide necessary shade for the bare branches.

Digging plants

Digging plants from open ground with balls of earth must be done carefully. If the weather is dry it is advisable, if at all possible, to water them well several hours before digging, so that water can be taken

up and the plant well supplied with it. Besides, this precaution will help the soil to hold together better, particularly if it is light. The size of the ball must be in proportion to the size of the plant. It should be large enough to be well filled with roots to help hold it together. But it must not be too large, because it may break away and will be more difficult to handle. The ball of earth is cut around and underneath carefully, then lifted and placed on a piece of burlap of suitable size, which is then drawn tightly about it and sewn, tied or fastened in place. Thereafter the balled plant should be lifted by the ball or by placing a board or piece of burlap beneath it. Every precaution must be taken to prevent breaking the ball or loosening the plant in it.

Even when set in groups, camellias are spaced so far apart in garden plantings that it is necessary to dig a hole for each individual plant. These holes should be at least six inches deeper and twelve inches wider than is needed for the balls of earth. This makes it possible to pack fair amounts of prepared soil beneath and around the balls. For large plants there should be larger holes to give greater space.

Size of holes

Holes in which plants are to be set may be dug at the time of planting or some time in advance. If the latter is done, it is well to fill in the holes loosely to prevent their drying out in the bottom and around the sides. In making holes, the top soil should be set aside for filling in, while the bottom soil is discarded and replaced with a good soil mixture.

Camellias make beautiful hedges. In planting them it is usually best to use small plants, so that branching may be started close to the ground. While they may be set in separate holes, it is advisable to dig a trench, space the plants properly in it and fill in around them.

Camellias should not be set deeper than they grew. There is really no easier way to stunt or kill them than to plant them too deep. When set in a hole, the top of the ball should be level with or somewhat above the surrounding soil. To do this the bottom of the hole should be filled in with good soil to bring the ball up to the proper level and the bottom of the hole packed firmly to prevent settling of the plant. The burlap about the ball should not and need not be removed. It is plant material, and new roots will grow out through it. Next, the space about the ball is filled in partly with earth well packed in place. Water in goodly quantity is given, and after it has sunk away, the hole is filled up to the ground level and the surface finished off with a basin about the plant to hold water. This basin should be large enough to hold ten quarts of water at least. Water is again applied, and the top of the plant syringed.

Depth of planting

If plants have been grown in containers, they are taken out and handled just as though they were balled and burlapped. If they have been in containers for some time and the roots have grown through the soil mass, the ball of earth will be held by them and there is no difficulty in planting.

When plants are dug from open ground, much of the functioning parts of the root system are cut off and left behind. These are the portions of the roots that take in moisture and nutrients from the soil for the use of the plant, and until they are replaced with new root growth, the supplies of water and food are greatly reduced. For this reason it is advisable to check the loss of moisture from the foliage as much as possible by syringing, and to furnish sufficient water in the soil to keep the greatly reduced portions of the roots well supplied.

Syringing newly set plants

Syringing reduces the temperature of the leaves, and this helps further in checking loss of moisture from the foliage. Watering at planting time serves two worthwhile purposes. Needed moisture is supplied, but water also settles soil in close contact with the roots and fills in any holes or spaces that may have been left, by washing earth into them. Water packs soil.

Mulching and shading after planting

It is best to cover the ground about the plant with a mulch extending a short distance beyond the circumference of the ball or as far out as the tips of the branches, and it is often well to furnish shade. This is particularly true if planting is late and the weather warm. Shade can be provided by placing four stakes in a square about the plant and stretching a piece of burlap just above but not touching the plant. Strict attention must be given afterward to watering and syringing, and this should continue for a year or more.

It is good practice to thin out the densely branched tops of large specimens when they are being transplanted. This pruning will remove useless wood and cut down transpiration by reducing the amount of leafage. This also helps in removing scale insects if they are present, for scales of several kinds are prone to seek shaded places among the interior branches.

12

FERTILIZING CAMELLIAS

FOR GROWTH, flowering and seed formation, plants require a number of chemical substances. Three of these, carbon (which makes up so large a part of the woody structure of plants), oxygen and hydrogen, are secured from the air, and the supply is abundant. Three others, nitrogen, phosphorus and potash, taken from the soil by the roots, are commonly regarded as being the most important because they are needed in larger amounts, and they are emphasized in all fertilizers commonly used. But equally essential though needed in smaller quantities, some of them in infinitesimal amounts, are copper, zinc, iron, magnesium, manganese and sulphur. The exact functions of some of these are unknown. It is possible that they act as catalysts. Calcium (lime), too, is needed but for some plants it must be avoided in its free state. This is true for both camellias and azaleas as well as a number of other plants. Some of these substances may be lacking in certain soils, or they may be present but locked up with other materials in the form of insoluble substances so that they cannot be taken in by plant roots.

Substances furnished in fertilizer

Nitrogen is needed for strong, healthy growth. Plants well supplied with it have large, green, widely spaced leaves and stout, vigorous twig or shoot growth. Lacking a sufficient amount, foliage is undersized, with a yellowish cast. It is possible to use too much nitrogen with the result that growth is soft, buds may drop and flowering may be prevented. There must be a proper balance between nitrogen and the minerals in fertilizers. If a large amount of nitrogen is used, then the phosphorus and potash particularly must be

Nitrogen

increased to preserve a proper balance. In fertilizers, nitrogen is often referred to as ammonia.

Phosphorus

Phosphorus, commonly secured from phosphatic rock, is available in the trade in the form of acid phosphate or superphosphate. It is found in all active plant cells and, in consequence, is a valuable substance for growth of all parts of the plant. It appears to play an important role in root development.

Potash

Potash is one of the most important substances used by plants in their growth processes. It helps to keep leaves firm and green and increases their efficiency in manufacturing sugar and starch, which are essential materials. Much of the food stored in growing points for future use is in the form of starch. Potash stiffens and strengthens the tissues of shoots and leaves and makes them more resistant to disease. It counteracts rank growth caused by the presence of too much nitrogen. It promotes flower production and the health and vigor of the whole plant. Plants well supplied with potash produce flowers of better substance and finer texture. Applications are particularly valuable on sandy soils. Potash appears to have value in bringing camellias into flower at an early age, and it may help to prevent the dropping of buds.

Minor elements

The other substances listed above are often referred to as minor elements, because, though they are most necessary for plant growth and welfare, they are needed only in very small amounts. Their absence from a soil is usually indicated by the lack of proper development of green coloring matter (chlorophyll) in the foliage. This condition is referred to as chlorosis, and a definite pattern often follows for each substance that is absent entirely or present in short supply. Intake and use of iron appears to be affected seriously, and this is reflected in lack of green coloring in the foliage.

Fertilizers used for camellias should be acid in reaction so that they may not injuriously modify the acidity of the soil. To this end certain acid or neutral materials only should be used, and those that are alkaline (basic) avoided. Among the latter are bonemeal, wood ashes, basic slag and other materials containing lime. Good for incorporating in camellia fertilizers are cottonseed meal, castor pomace, ammonium sulphate, superphosphate, sulphate of potash and muriate of potash. Cottonseed meal is often used alone, but it is best to have a mixture of several of the materials listed. If there is need for further safeguarding the effects of fertilizer by increasing its acidity, aluminum sulphate may be added or sulphur applied separately as recommended in the chapter on soils. A formula in use for many years with good results is as follows:

Fertilizer formulas

Ammonium sulphate	10 pounds
Superphosphate	35 pounds
High-grade sulphate potash	17 pounds
Cottonseed meal	28 pounds
Aluminum sulphate	10 pounds
Total	100 pounds

If there is need for some of the minor elements, this formula may be modified to include them.

Ammonium sulphate	10 pounds
Superphosphate	30 pounds
High-grade sulphate potash	15 pounds
Cottonseed meal	25 pounds
Magnesium sulphate	5 pounds
Manganese sulphate	5 pounds
Sulphate of iron	3 pounds
Sulphate of copper	2 pounds
Sulphate of aluminum	5 pounds
Total	100 pounds

These formulas analyze approximately 4 percent nitrogen, 6 percent phosphoric acid and 8 percent potash, and the reaction is acid. Fertilizers specially prepared or mixed for growing camellias are available from a number of manufacturers, and these generally have given satisfactory results.

Care must be exercised in the use of commercial fertilizers, particularly in regard to the amount and the manner of application. At times injuries to camellias have resulted from applying fertilizers. Usually this has followed too high concentration or the use of the wrong materials or of too large amounts. Essentially the grower is to blame in many cases, and not the fertilizers. In suitable quantities, fertilizers are definitely helpful in securing good growth and bloom, but if too much is given, injury to the plants will result. It is best always to give too little rather than too much. A camellia six feet high and four feet through the spread of branches can use an application of two and one-half pounds, while one that is two to three feet high and proportionally wide will be benefited by one-half pound but would probably be injured if given three pounds. In different areas the amount needed will vary, but a general rule to follow is to give a plant two to three feet high one-half pound at each of two applications, and for each foot above three feet add one-half pound for each of two applications. Or stated otherwise, a plant four feet high would be fed two pounds divided between two applications, while a plant eight feet high would be given six pounds similarly divided.

Amounts of fertilizer

There are several different ways in which fertilizer can be given to camellias. The common method is to scatter the fertilizer material thinly over the mulch or ground surface. The quantity should be under rather than over the amount deemed necessary. It should not

Applying fertilizer

be placed up against trunks of plants but back several inches from small plants growing in open ground and a foot or two from trunks of large specimens. Fertilizer for larger plants will be applied under the tips of branches and outward in a yard-wide band. For quicker results, especially in dry weather, fertilizer may be dissolved in water, an ounce to a gallon of water, and sprayed or sprinkled over the mulch or soil.

It has been determined that camellia leaves will absorb nitrogen. Quite recently the effect of nitrogen-bearing fertilizers in solution sprayed on camellia foliage has been studied by Dr. E. C. Tuttle* in Texas, using NuGreen at the rate of five pounds to 100 gallons of water or three level tablespoonfuls to a gallon. Camellia plants in a starved condition were benefited greatly. Normal dark green color in the leaves was restored and later the stunted plants resumed normal growth. In his work, Dr. W. E. Lammerts* in California used urea in the same way. Growth of plants was hastened, the general appearance and the results were satisfactory. Potash and phosphorus in usual forms are not taken in by camellia leaves and must be applied to the soil.

Where camellias are growing as specimens and have reached considerable size, it is a good plan to fertilize them by plugging; this is the best plan if they stand apart on a lawn. A steel bar or a pointed stake is used. A ring of holes is made outside the tips of the branches staggered over a band about three feet wide. The sharp iron bar or stake is thrust into the ground and worked about to make conical holes four or five inches wide and a foot deep. Into each of these a couple of handfuls of fertilizer are dropped and the hole filled up with soil. This puts the fertilizer down where the roots can reach it and where it is not so readily taken

*See American Camellia Yearbook, 1950, for further information.

up by the grass roots. Good soil or well-rotted manure may be used in the same way by digging holes with a sharp narrow spade or post-hole digger and filling them. Where the ground about camellias is covered by a mulch, the best plan in fertilizing is to scatter the fertilizer over the mulch and wet it down with water from a hose or watering can. If the mulch has rotted and the covering is thin, the fertilizer may be scattered over it and then covered by additional mulch.

Number of applications

Two applications of fertilizer a year give satisfactory results, one about a month before growth starts in spring and the second about four months later. At latitude 30° north the dates would be February 15 and June 15. Dates of the applications in other areas would be earlier or later, depending upon when growth usually starts.

Frequently the question is asked whether stable manure is a good fertilizer for camellias. By all means, its use is recommended. The chief difficulty is that there is too little of it and it is hard to obtain. When decomposed so that it has lost all odor, it is a superior material for enriching the soil and adding to its organic matter content. Manure from dairy stables is particularly good. The use of liquid fertilizer made by steeping manure in water is recommended. During the summer months it produces especially good results. The old rule "weak and often" for using it, still holds good.

13

CULTURE AND CARE

SINCE camellias are broad-leaved evergreens, there is no time of year when they do not need attention. Within the period between emergence of new twigs with their complements of leaves in spring and the slowing down of growth processes in autumn, several changes take place in the plants. Leaves and twigs harden and mature, and flower and shoot buds enlarge and complete their development, ready for opening and growing later on. It is during this period, extending through the summer months, that the plants should have care almost from day to day. Insects and mites must be controlled and water and fertilizer supplied, with frequent syringing during dry periods. The price the gardener must pay for healthy, vigorous plants and fine flowers in winter is the strict attention accorded the plants during the summer. During the colder season they also need care. Watering and syringing are necessary throughout the year.

A mulch is valuable in several different ways, and though these values may be and are here considered separately, to a very large extent they are interlocking. In the first place, a mulch serves as a soil blanket, and as such it prevents evaporation of moisture from the surface it covers. It follows then, if camellias need watering from time to time, they will require less when they are mulched. The temperature of the soil beneath is also affected. Variation or fluctuation is controlled; the earth beneath a mulch is warmer in winter and cooler in summer. This condition of uniform temperature is favorable to the activity and development of camellia roots. Composed as it is of

Mulching

plant materials, a mulch adds to the organic matter of the surface layer of the space covered by it. It contains mineral substances and much of the other materials necessary for plant growth; as it decays, these are released to the soil for use by the plants growing in it. Also as the mulch breaks down, organic acids are formed, and these are carried downward to help in maintaining a helpful reaction in the soil. Weed growth is checked or eliminated, which results in conserving moisture and plant food. Root-knot-forming nematodes, which sometimes attack camellia roots, are checked by mulching. For these various reasons, mulching is a good practice to follow.

Many different kinds of plant materials, mostly refuse, are used for mulches, and the best plan is to select one near at hand that is readily and cheaply available. In one part of the camellia area, the mulch may be of leaves, of which there is nothing better than those of pines and evergreen oaks. It may be made of peanut hulls, sugar-mill refuse (bagasse) or bark broken in small pieces. Both domestic and imported peat is in wide use. Leaves of deciduous trees are not so lasting as those from evergreens, and therefore the latter are preferable. A combination mulch consisting of a thin layer (two inches thick) of well-rotted, pulverized cow manure covered by a layer of leaves or peat is excellent. A mulch about two inches deep should be maintained, and as it decays and becomes thinner it can be renewed when suitable material is at hand. Once started, mulching should be continued.

Materials used for mulching

Roots of camellias must not be buried deep in the earth at time of planting or at any other time, because air necessary for their growth is then excluded. Some have argued that a mulch is detrimental, but it does not have the same effect as a layer of soil because there

is a great difference in density. The mulch does not interfere with aëration. The amount of material furnished by the mulch as it decays adds very little to root coverage, and there is no danger in using it.

Water is nature's great solvent. Because this is so, it plays a most important part in plant growth and development. Nutrients present in the soil are usually in solid form at first. They are dissolved in water and are then taken up by the roots. Unless the plant food goes into solution, the roots cannot take in what is needed for growth, flowering and seed production. There also must be a continuous movement of liquid through the plant. This movement is slowed down at times but if stopped completely the plant cannot long survive. It is necessary that the active cellular structure be well filled with liquid, of which water is the most important part. Reduce the amount and the plant wilts; reduce it further and leaves and twigs die; continue the reduction still further in amount or time and the whole plant dies. The greatest single basic requirement for plant growth is water.

Watering

Camellias came originally from areas of heavy rainfall. Therefore, naturally they require water in generous amounts for satisfactory growth, and best results are secured if the supply of water in the soil is subject to little variation. In much of the area in which camellias are grown rainfall is ample; but in some sections, though ample, it is irregularly and unevenly distributed throughout the year. At times there may be much more than is needed, and drainage is necessary to take care of the excess; at other times there may not be enough, and it becomes necessary to supplement rainfall with water from various sources. In cities, the water used usually will be neutral or slightly alkaline. Suitable supplies in rural areas generally can be ob-

tained from ponds, marshes or from streams that flow through lime-free soils; and, of course, there is nothing better than rain water. Sometimes it is possible to collect and store it in a tank or cistern. In some areas water commonly used for domestic purposes is soft, *i.e.*, free from mineral substances such as calcium and magnesium, while in others it is hard. Water from deep wells sometimes carries lime or magnesium or both in excess amounts. Even small quantities may result in accumulation of excess amounts in the soil through the continued use of hard water. The water should be checked chemically and if found to be alkaline, its alkalinity should be reduced. This may be done by adding sulphuric acid, or its ill effects may be offset by applying aluminum sulphate or sulphur to the soil. Ferrous sulphate or aluminum sulphate also may be added directly to the water to change its reaction downward.

Kinds of water

Frequency of watering depends upon several things —the character of the soil, the season of the year, condition of growth and temperature. The good grower will consider these factors and apply water from time to time to meet the needs of the plants. More will be required when the plants are in flower and when the new growth is shoving out than at other times. It is always better to water thoroughly at intervals than to give small amounts frequently. The soil should be well moistened to a depth of several inches at each application. If there is any doubt about the depth of penetration, holes may be dug with a trowel here and there to determine the depth to which the water has gone into the soil. When plants are in bloom, flowers may be injured in watering if too much force is used. This is particularly true of white flowers. It is best to water the surface of the ground only and to keep

Amount of water

water off the plants when they are flowering. The tops should, of course, be syringed with a fine spray even when the plants are in bloom.

Syringing the foliage is very beneficial; camellias respond to it. Water should be applied in a fine misty spray until it drips from the plants. In hot dry weather syringing should be done frequently, but it is also beneficial in winter. Late in the afternoon is a good time. Water given as the sun goes down will go further than in the heat of midday, because there is less loss from evaporation. Syringing is helpful in reducing temperature and in keeping leaves clean.

Syringing

Wild forms from which cultivated camellias are derived grow naturally as undershrubs in woodlands where they are protected by taller trees. On the whole, partly shaded locations are better for them than continual shade on one hand or full sunshine on the other. Something, too, depends on the amount of cloudiness. If there is much cloudy weather during winter, artificial shade is not so essential. In some areas camellias are grown extensively in open fields, but the foliage is not so good as under partial shade or where they are in the shade for part of the day. Plants exposed to full sunshine after frosty or freezing night temperatures are likely to have their leaves damaged, whereas if shaded they escape injury. Some varieties are definitely more subject to leaf burn from the rays of the sun than others.

Shading

Small plants, for which shade is more essential than for large ones, can be shaded by using burlap supported on stakes. In some sections plants are grown under slat sheds; these are particularly valuable for small plants. Shade can also be provided by planting quick-growing trees such as slash pine and *Albizzia Julibrissin*. At Fort Valley, Ga., in the David C. Strother garden, pines have been planted and grown for shade,

Trees for shade

and at Savannah, Judge A. W. Solomon has used albizzia as shade for young plants. In choosing trees for shade, those with abundant surface roots should not be used, nor should those that cast too heavy shade.

Considerable protection from frost damage in winter may be obtained by shading plants from the sun during the first half of the day. This may be done with burlap or cloth or by setting large branches or the tops of small pines in such position as to cut off the direct rays of the sun. In planting, a location often can be selected so that a neighboring tree or building may provide shade for part of the day, particularly the morning. More complete protection can be provided with a light movable cloth-covered framework made in five pieces for the four sides and top, to be set up around a plant when low temperatures are expected. Additional protection can be secured by using a small heater set inside the framework that encloses a plant. Even a single ordinary light bulb may furnish enough heat in such an enclosure to keep off frost. Plants should not be kept covered for long periods. If protection is necessary for some time, the top part of the cover should be removed for part of the day whenever possible. Camellias may be grown against garden walls as a shelter against cold and strong winds, a plan frequently followed in England.

Frost protection

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PRUNING AND TRAINING

NATURALLY Japonica camellias form symmetrical plants with compact, well-foliaged heads. They are especially useful in formal plantings because of the small amount of care necessary to maintain their shapes. About all that is needed is to select varieties of desired form and then shear them as required to keep them the size wanted. Some of the Sasanqua varieties also are compact plants, and their very glossy foliage makes them particularly attractive, but many become graceful, open-headed shrubs if allowed to grow without restriction. But regardless of their natural growth forms, all varieties respond well to pruning and shaping and can be made dense headed and formal. Saluen plants resemble Japonicas in compact growth habits, forming specimens with dense heads. Plants belonging to all three of these groups are especially fine for hedges, and when well grown, trained and pruned are most satisfactory.

Tools for pruning will consist of a pruning saw, pruning shears and a keen-edged knife. There are many different kinds of pruning saws, but whatever kind is chosen should always have fine sharp teeth. Pruning shears of seven or eight-inch size are a necessity. They should be well made of high-grade steel and kept tight and sharp at all times. There are excellent special pruning knives, but a heavy pocket knife will do. It is a pleasure to use fine tools, and if a good job of pruning is to be done, they should be kept sharp.

Pruning tools

While camellias may be pruned at almost any time of year, it is well to avoid the period when new shoots are coming out and developing, because of the

danger of injury to the tender growth. It is also advisable not to prune when plants are in full flower,

Time for pruning

for fear of injuring blossoms. Just after flowering is an excellent time, and for potted plants the best time is when they are repotted.

Removal of flower buds where there are too many of them is really a form of pruning. It is best to leave only one bud at the end of a twig. This should be done as soon as the flower buds can be distinguished readily.

Disbudding

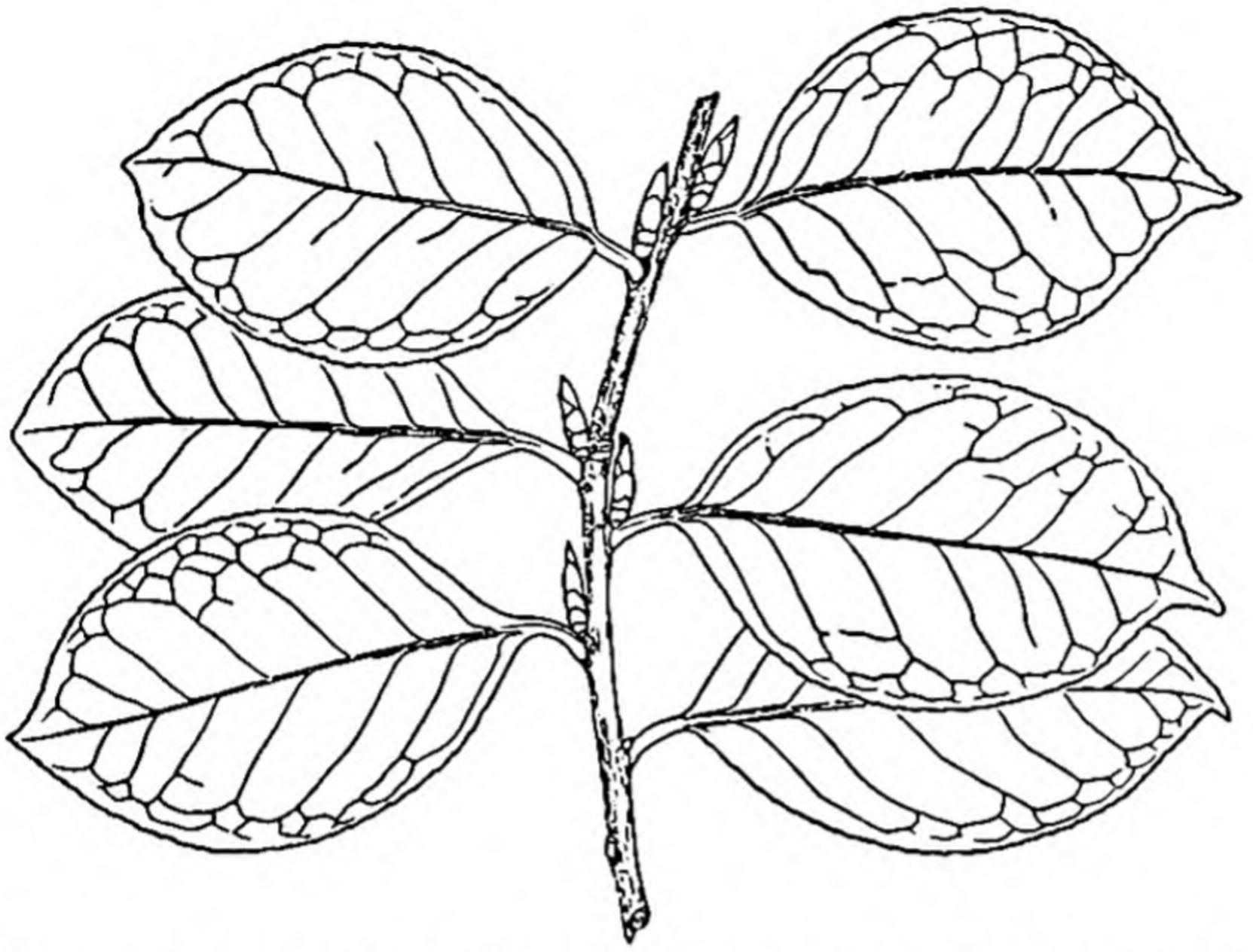
Disbudding is difficult with large plants and large collections, but it is wise to limit the number of flowers on small plants in order to have finer, larger blooms.

All cuts should be left with a smooth surface. If they are rough from the teeth of the saw, they can be smoothed with a sharp knife. This makes for better healing; and if a protective paint is used, it will cover better than when the surface is rough. Cuts also should be made close to and parallel to the surface of the trunk or branch from which the branch is removed. Splitting can be eliminated in cutting out large branches by first making a cut halfway through the branch a little way out on the underside and then finishing the operation by cutting on the upperside close to the trunk.

Making and protecting pruning cuts

Small wounds left in pruning need not be painted, but it is best to protect larger ones with a good house paint soon after a branch is cut away. Paints containing wood preservatives must be avoided, for they are likely to do more harm than good. A satisfactory paint can be made by mixing dry Bordeaux with linseed oil.

Examine a Japonica twig carefully in late summer or early autumn. By then it is possible to find three kinds of buds—perhaps not all present on one twig—but they can be located if a few well-grown twigs on a plant of flowering age are examined. The largest



Pruned twig showing effect of removal of tip—five shoot buds developed from latent buds. One latent bud at bottom leaf

Effect of pruning on shoot development

bud, oval or ovoid in outline, at the tip of a twig is a flower bud. Usually there is only one, but there may be a pair, or in some cases more. Besides the flower bud and between it and the point where the leaf petiole joins the twig, there will be a smaller, sharp-pointed bud; or if there are two flower buds, it will be between them. This is a shoot bud from which growth next season will be prolonged. In the axils of the next two or three leaves additional shoot buds—slender, green and sharp pointed—may be found. Sometimes they are absent. From such shoot buds side shoots will start when growth begins in spring. If they are not present, they are replaced by tiny latent buds, and these are present in leaf axils still further down along the twigs. These shoot and latent buds should be noted carefully. Under normal conditions growth starts only from shoot buds. Now, in pruning, these are the buds that should be left if growth is wanted

the following season from that twig. If no shoot buds are present along the sides of a twig and its tip is cut away early enough in the spring, the latent buds are forced into growth to become shoot buds. Usually during that season they make no further growth, but the next spring shoots grow out from them. Hence the number of branches in the top of a camellia plant can be increased by clipping off the tips of twigs and so forcing latent buds to become shoot buds; then later shoots will start from them.

Camellias need to be pruned to remove dead, diseased, insect-infested, stunted twigs and branches. Pruning is also useful in rejuvenating plants that for one reason or another are in poor condition and making unsatisfactory growth. It helps to maintain desired forms of plants and to keep them within prescribed space as they grow on from year to year. Camellias lend themselves well to this sort of treatment.

Inside pruning

Dead and diseased wood harbors disease-producing organisms that may be the cause of dieback and other troubles. These twigs also interfere with the development of new growth. They usually are confined to the interior of the heads of the plants where they have received insufficient light and plant food. Here, too, will be found numerous twigs, if pruning has not been done regularly, that are bare of leaves except for a few poorly developed ones at their tips. They are useless and should be cut away. If scale insects are present on a plant, these shaded leaves and twigs are a favorite resort for them. Removal of infested leaves and wood by pruning does away completely with pests present on them; with these worthless parts out of the way, a much better and more thorough job of spraying for the control of those that remain can be done. It is a general principle that scale insects must be

reached by the spray if they are to be destroyed, and any interfering, useless plant parts are best removed before spraying.

This general plan of pruning is based on the removal of poorly developed growth from the interior of the tops of the plants, which leaves them open within but covered by foliage carried by healthy, vigorous branches over the outside of the top. It is not intended that the interiors be opened up or exposed.

It is true of Japonicas particularly, that they naturally form compact, symmetrical, well-foliaged heads, and but little pruning is necessary to maintain their natural forms. There should preferably be a single central trunk or axis in upright, narrow-growing varieties. It must be emphasized also that while camellias respond well to pruning and their shapes can be altered, it is best to let each variety develop its own characteristic form. It is not advisable, for instance, to attempt to make a narrow upright plant out of one that grows normally with more width than height, nor to try to make a wide flat plant out of a variety that normally forms a strict upright head. If a certain shape is desired for a particular location, select one that grows naturally in that form. A little pruning will help in shaping a plant, but pruning for this objective should be limited to cutting back or removal of wayward branches.

Forms of plan

Pruning and training should start with the plants when they are small. These are more easily trained, and new growth can be directed to form the shape desired. It is easy, for example, to flatten a young plant against a wall or trellis and keep it there as it grows, but difficult or impossible with an old one. After all, camellia plants are somewhat like human beings.

For several reasons camellia plants at times do not

make satisfactory growth, leaves are few in number and flowers poor, if produced at all. Sometimes recently transplanted specimens do not start off properly, but established plants may also decline. At times the reason is difficult to understand. It may be caused by too deep planting, if this has recently been done, to poor drainage or a change in drainage, or to increased scale infestation or diseased conditions. If the cause can be determined it should be eliminated, or it actually may be necessary to move the plant to another location. Steps must be taken to get the plant into good growing condition. Attention must be directed to watering and fertilizing, and the use of liquid fertilizer is recommended. Severe pruning is best. If there are twigs with good foliage here and there that appear healthy, leave some of them and cut back the top to fair-sized branches. There should be an eye to the shape of the specimen when new growth is induced. New shoot buds will be forced out from latent over-grown buds, and from these new growth can be expected. If the plant is exposed to sunlight, it should be shaded. The important things are watering, feeding, shading if needed, but above all, pruning.

Pruning plants in poor condition

15

CAMELLIAS IN GARDENS

THROUGHOUT those areas where camellias are grown in gardens, other broad-leaved evergreens also are used in landscape plantings. To many conditions and for many purposes, trees and shrubs belonging to this group are better adapted than the coniferous evergreens so much planted in colder parts of the country. Among these broad-leaved evergreens, large use is made of *Ligustrum*, *Viburnum* and *Ilex* in several species and varieties, *Aucuba*, *Feijoa*, *Raphiolepis*, *Photinia*, *Abelia*, *Myrtus* and *Illicium*, to name only a few. These lend interest and variety to the grounds; they are well adapted, useful and valuable.

But it may be pointed out that within these same areas there is scarcely a purpose for which these broad-leaved evergreens are valuable that cannot be filled equally well and sometimes better by camellias of one kind or another, simply because they too are evergreens. In addition to being evergreens with fine glossy foliage, they come into bloom when nearly all other broad-leaved evergreens suitable to the same regions are out of flower; and certainly camellias are surpassed by none of them in the wide variety of forms, color and beauty of their blooms. These statements are made to indicate the values of camellias and the wide range of uses to which they are adapted, not to advocate planting them to the exclusion of other good woody plants such as those mentioned.

Garden values

Camellias have a number of valuable characters that should be noted and stressed. They stand pruning well. If so desired, they can be pruned and grown to present a smooth surface of bright, glossy green;

and what is also important is that they are so amenable to pruning and shearing that they can be kept within such limits as may be wished for many, many years. Another feature is their adaptability for growing in the shade. They do well in locations where no direct sunlight ever reaches them, and they will flower well in such places. There are few other woody plants of which this is true. Many may be grown in shade, but they then lack compactness and do not bloom at all, or not so well as they do in sunlight.

Giving attention to form

It is advisable in garden plantings to pay attention to the form and outline of the tops of camellia plants. They vary greatly, and it is worth while to take advantage of their individual shapes, which are important characters. Some, such as Dawn, Professor C. S. Sargent and Texas Star, have narrow, compact or strict, upright heads. Others, for example Elegans, Mine-no-yuki and Aunt Jetty, are open and spreading, and some varieties even are vasiform. Other kinds, like Lady Clare, Alba Plena and C. M. Hovey, after the lapse of years will have formed heads that measure more in width than they do in height. Then there is a long list of varieties, like Frau Minna Seidel, Debutante, Mathotiana and Lady Humes Blush, that form dense, upright or somewhat conical heads. A study of variety shapes or forms will reveal many characteristic types among different kinds of camellias. When plants have taken on age, these differences stand out, but in many cases they are noticeable even in small specimens.

Foliage characters of various kinds of camellias are important. They present definite differences that can be used to advantage to secure contrasts in garden groups. To emphasize these values compare the leaves of Willow Leaf, Lallarook and Appleblossom with

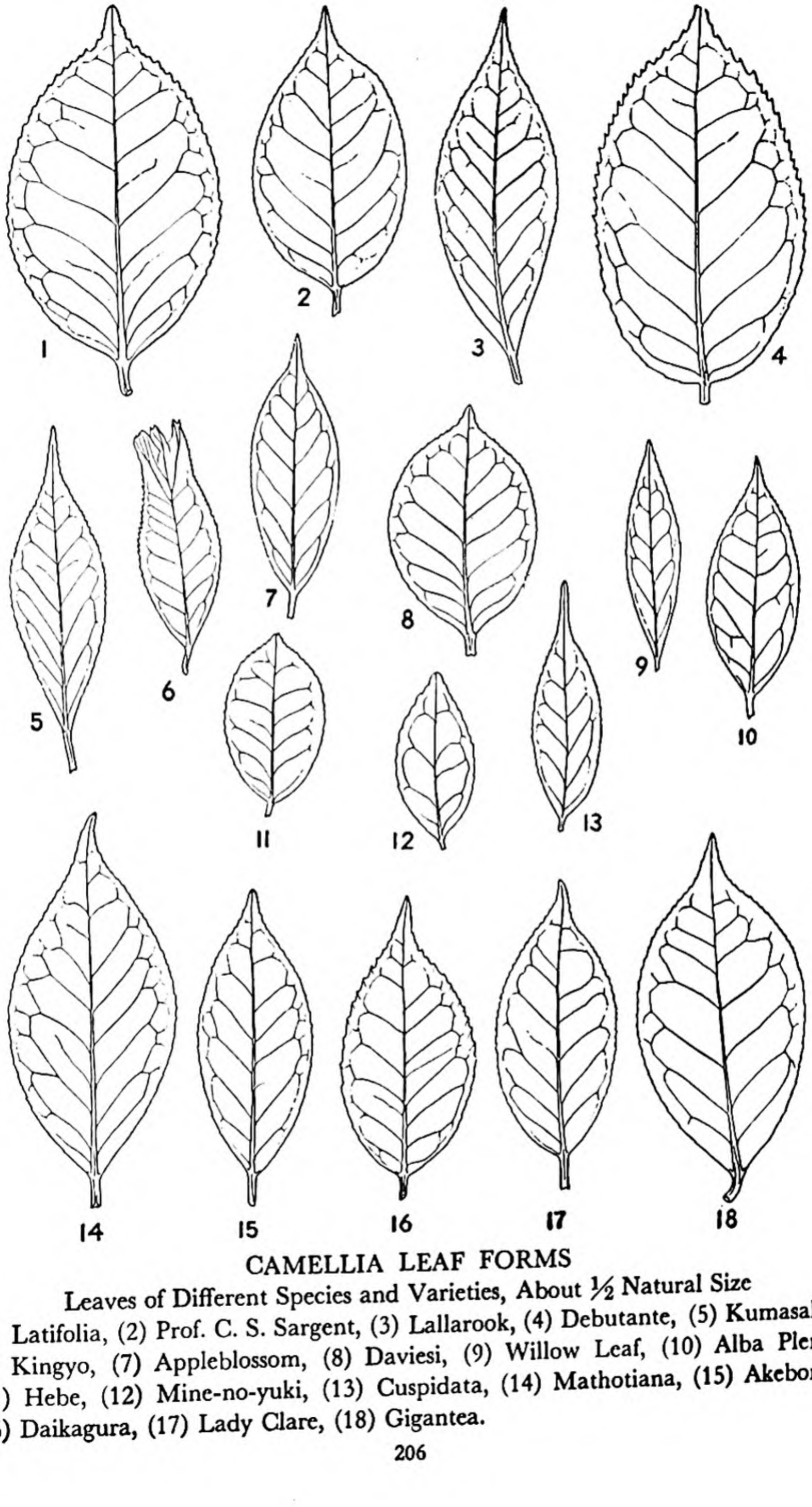
their narrow outlines, tapered bases and sharp pointed apices, with the larger size and greater width of the leaves of Gloire de Nantes and Mathotiana or the almost circular leaves of Daviesi, and it will be realized that there are distinct varietal differences in camellia foliages. It is interesting, too, that while flowers of some varieties vary greatly in form, leaves do not. They follow an unvarying pattern for the variety, and breaks from that pattern seldom, if ever, occur. Branches carrying a distinctly different type of foliage do not accompany flower variations.

Leaf characters

Differences in foliage, as seen in mass, in many instances are useful in separating varieties from one another, but unfortunately many of these differences and peculiarities are difficult to describe. Words fail in making them clear. Those who constantly work with camellias, however, come to distinguish many varieties from one another by their leaf characters, even though the differences may be very slight. Other varieties, such as Imura with its drooping foliage, Alba Plena with its curved, somewhat twisted leaves, Tricolor with depressed leaf margins in the central parts and Kingyo with divided fishtail-like leaf tips, are all easily recognized. Apices differ, too; some are tapered gradually to a sharp point, while others end in short, abrupt tips. Margins vary in the size and prominence of their teeth. Leaf color is not the same for all varieties. Some leaves, like those of Debutante, are light yellowish green; others, like those of Lady Clare, are dark glossy green. Young leaves of light-colored varieties are light green as they emerge; those of red-colored sorts are pink or wine-colored. All of these differences add interest to camellias in the garden.

Peculiarities of foliage

The free-flowering habit of garden camellias must be emphasized. It is well enough to have good green



CAMELLIA LEAF FORMS

Leaves of Different Species and Varieties, About ½ Natural Size

(1) Latifolia, (2) Prof. C. S. Sargent, (3) Lallarook, (4) Debutante, (5) Kumasaka, (6) Kingyo, (7) Appleblossom, (8) Daviesi, (9) Willow Leaf, (10) Alba Plena, (11) Hebe, (12) Mine-no-yuki, (13) Cuspidata, (14) Mathotiana, (15) Akebono, (16) Daikagura, (17) Lady Clare, (18) Gigantea.

masses, but it is possible, and better still, to have flowers in such numbers as will make a good showing when the plants come into bloom. Light-colored varieties show off to advantage. Bessie McArthur, Herme, Hishi-karaito and Snowdrift are good examples of light-colored, free-flowering varieties. Perfection in blooms can be sacrificed for mass flowering, but if the two can be combined, so much the better.

Free flowering valuable in garden specimens

Camellias in early gardens of the South usually were grown as single specimens, and many fine plants have survived the years. In pairs they accented the garden gate, the steps that led to the house, or they stood out singly, separate and apart on the lawn. There is still a place for individual specimens, but they can be used in many other ways where their beauty of form will be a fine addition to the garden. They can be set at the end of a vista; they can be used as a part of the house design; they can be planted in small groups of three or five spaced far enough apart to prevent crowding and to allow them to develop their characteristic forms.

Uses in gardens

Walls are a feature of many gardens in England. Often they serve several purposes. They divide properties from one another; they enclose and give privacy to the grounds of which they are an integral part; they cut off wind; they conserve heat and moisture, and they make possible the culture of many plants in locations where they could not otherwise be grown. Sometimes the wall of a house or some other building serves as a wall for gardening purposes. In many instances, walls have been built especially to make possible the culture of certain plants. Against them fruit trees that require additional sun and heat for their fruiting are planted. Ornamental trees and shrubs, too, are grown, spread out and trained against them.

Planting against walls

In gardens here and there, particularly in the Channel Counties of England, camellias are grown against garden walls. At Caerhays, specimens of several kinds of Sasanqua camellias are growing against the castle walls. At Scorrier House, also in Cornwall, there are camellia walls of unusual beauty, approximately 1000 feet long and fifteen feet high, on which camellias have been grown and trained for many years, some of them perhaps for a century or more. They bear their years well, but they look that old. They are beautiful plants of large size, one measuring thirty-five feet in spread of branches and many others nearly as much. So while the walls are long, the number of plants is not so great as might be expected. For the most part they are Japonicas but there is a fine specimen of Lindley's *C. maliflora* and several of *C. reticulata*, another of Lindley's species. Were these planted soon after Lindley named them in 1827? Who knows? In other places camellias are growing on or against the walls of houses, trained around windows and other openings, lending softness and beauty, and clothing bare surfaces of brick and stone in living, shining green.

Garden walls

For the training of camellias on walls, spikes (pitons) are driven into the mortar and to these the branches are fastened. Sometimes wires are strung on the spikes to form a pattern of rectangles, and to these wires branches are fastened and so held in place. Sometimes the plants are kept quite closely trimmed so that the branches extend only a few inches out from the wall; while in other gardens, as at Scorrier House, there is quite some depth to the branching, *i. e.*, from wall surface to branch tips. These walls afford protection against low temperatures and the shearing and drying effects of wind, and at blossoming time the camellias are a breath-taking sight with their flowers in great

numbers against the glossy green foliage. When not in bloom, camellias are unsurpassed as a fine green wall covering. When such plantings are made, the plants are set close up against the wall, care being taken to see that lime and mortar are not part of the soil in which they are planted. Wide use of camellias trained against walls should, and can, be made in the camellia areas. They can be grown on walls of houses and other buildings.

Camellias in foundation plantings

For many places in foundation plantings, camellias are fitting plants. They blend well with other broad-leaved evergreens and introduce no strange, no bizarre note in the ensemble. They are excellent plants to accent an entrance, to soften the angle of two walls. For space that is limited in width there are narrow, upright-growing sorts to plant against blank open walls, and there are slow-growing or actually dwarf varieties to fill in beneath windows. The pruning shears can be used to keep within bounds those that may grow beyond their allotted space. If walls are of brick or stone, specimens can be planted close to and trained against them as they grow, and so occupy little space from front to back. They bring additional beauty and character to their surroundings, and when they come into bloom they grace any composition of which they are a part. There are indeed few places in garden making, where shrubs are needed, to which camellias are not adapted.

Camellias for background

Camellias set in an irregular line or in a straight one make a fine background, and different varieties may be used as a good setting for azaleas of different kinds or for such perennials as daylilies, liriope, crinum, alstroemeria and iris. The beauty of such plants and of annual flowers is enhanced greatly by the rich dark green wall of camellia foliage, and such a background can be a beautiful part of a garden. The area where

the shrubs, perennials or annuals are planted should be open to the sun for the sake of the latter.

Camellias in borders

Either used alone or with other broad-leaved evergreens, camellias are excellent for border plantings on boundaries of the garden or along the sides of walks and drives. Varieties of different forms and producing flowers of different colors—white, pink, red or variegated—can be used together without fear of their clashing with one another when in bloom. Larger or taller specimens will fill in the background; smaller or slower-growing kinds will be used in front. Japonicas can be mixed with Sasanquas and varieties derived from other species to make a camellia border. Other shrubby plants, such as feijoa, illicium, viburnum, azaleas and hollies can be planted with them to give greater variety, and deciduous shrubs and small trees can also find a place. If camellias alone are used in a border, attention must be given to form and relative rate of growth, remembering, of course, that camellias are easily kept within a given space by judicious pruning. They can be pruned and still left to grow in their natural shapes. Informality can be accentuated by using Sasanqua varieties, some of which are open and spreading in habit.

Screens and hedges

There are no finer plants for screens and hedges than camellias. Varieties belonging to the two groups Japonica and Sasanqua have been used to a limited extent, and *C. sinensis* has also been planted for hedges, particularly in the general vicinity of Charleston, S. C. The glossy bright persistent leaves of these species make them most desirable for this purpose, and the blossoms of *C. japonica* and *C. Sasanqua* are an added attraction. They may be allowed to grow informally for tall screens and also informally for hedges, with only a little pruning to keep straying branches within

bounds. They can be planted for formal hedges and kept at any height desired. Pruning once a year, just after flowering is over, is sufficient to keep them in shape; no plants stand it better. If complete uniformity in growth is desired, a single variety will be used, and there will be added beauty at blooming time because of the larger number of flowers of one kind opening together. It is more difficult to secure and maintain uniformity if several varieties are used, because of differences in forms and growth habits. Of course, nothing can be done to make the foliage of one variety look like the foliage of another if they are distinctly different. If the plants used are of same age and size, specimens branched to the ground should be chosen; but small specimens can be utilized, cut back slightly to secure branching and compactness at the ground. For planting, it is advisable to dig a trench wide enough and deep enough to accommodate the roots, whether bare or balled and burlapped. The plants are set in place at proper distances, about eighteen inches apart, and planting is completed by packing good camellia soil around and between them, being careful that they are no deeper than they grew.

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POT AND GREENHOUSE CULTURE

CAMELLIAS may be grown in greenhouses far outside the areas in which they are cultivated as garden plants. Within a greenhouse, soil can be made to fit their needs and climatic conditions suitable for their best growth and flowering can be maintained in many places where their cultivation otherwise would be impossible. If natural earth is unsuitable, it can be removed and replaced with good soil. The ill effects of wind—cold, hot, dry or strong—can be offset, temperatures can be adjusted, shade can be provided, humidity maintained, the water supply regulated and soil-borne diseases eliminated. In wide-open spaces environmental factors are difficult to change or control, but in a greenhouse they can be largely modified.

While a greenhouse is most commonly used as protection against low temperatures in winter, it is valuable for other reasons even in mild climates where very little artificial heat is ever required. Here variability in climatic conditions can be eliminated to a large extent. Better growth can be secured and injury to opened or opening flowers avoided. The beating or otherwise injurious effects of heavy rains are cut off, and it is possible to produce flowers of finer quality in a greenhouse than in the open, principally because environment can be controlled. This is true to such an extent that in camellia flower shows competition between garden- and greenhouse-grown flowers is avoided by setting up separate classes for each kind. It is realized that garden-grown flowers are at a disadvantage when competing with those grown under glass. In adaptability to greenhouse culture either in

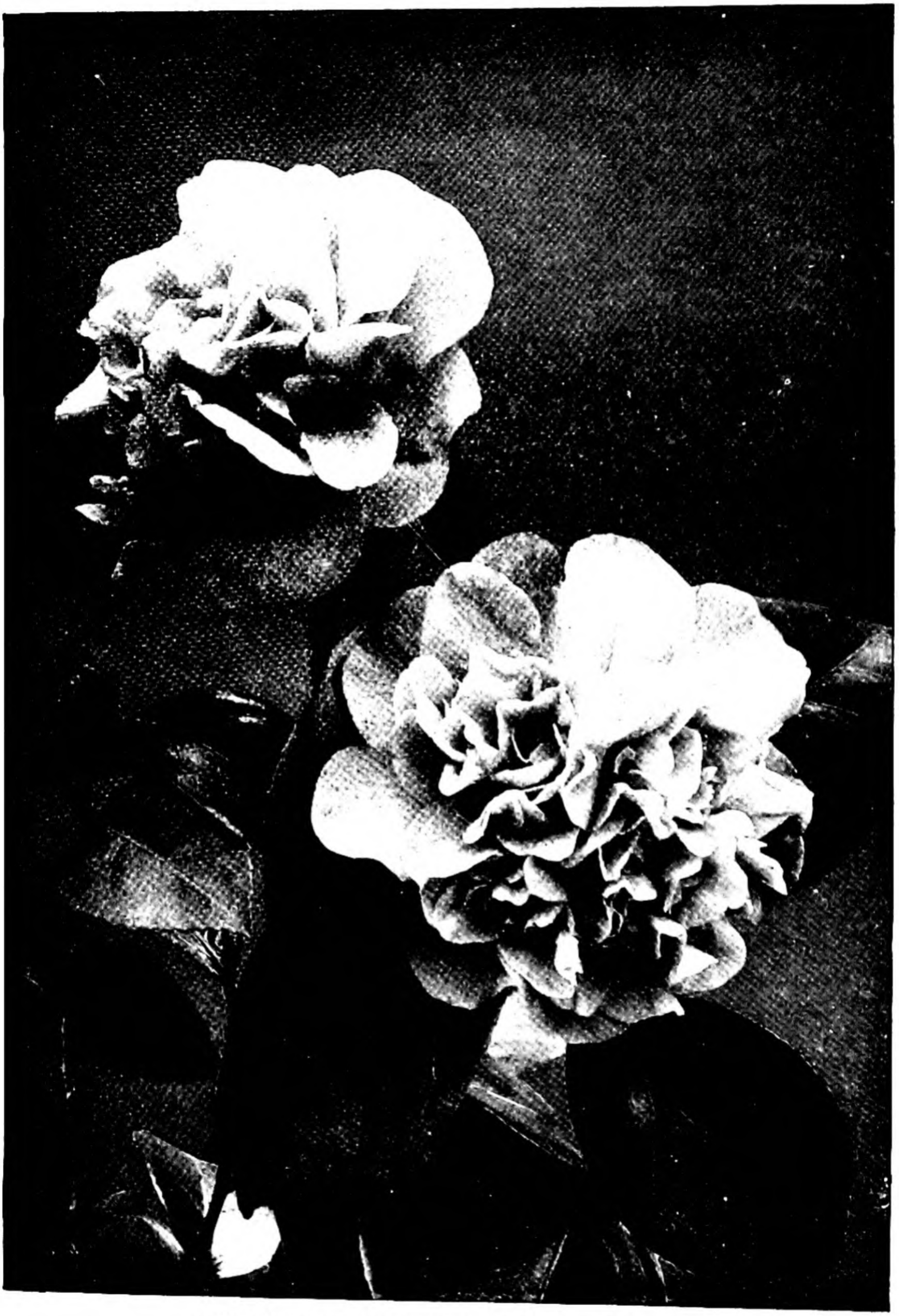
Value of greenhouses



CAMELLIA JAPONICA, MERMAID



CAMELLIA JAPONICA, ORANDA-GASA



CAMELLIA JAPONICA, PRESTON ROSE



CAMELLIA JAPONICA, QUEEN BESSIE



CAMELLIA JAPONICA, REV. JOHN BENNETT



CAMELLIA JAPONICA, SHU-BENI-HITOE



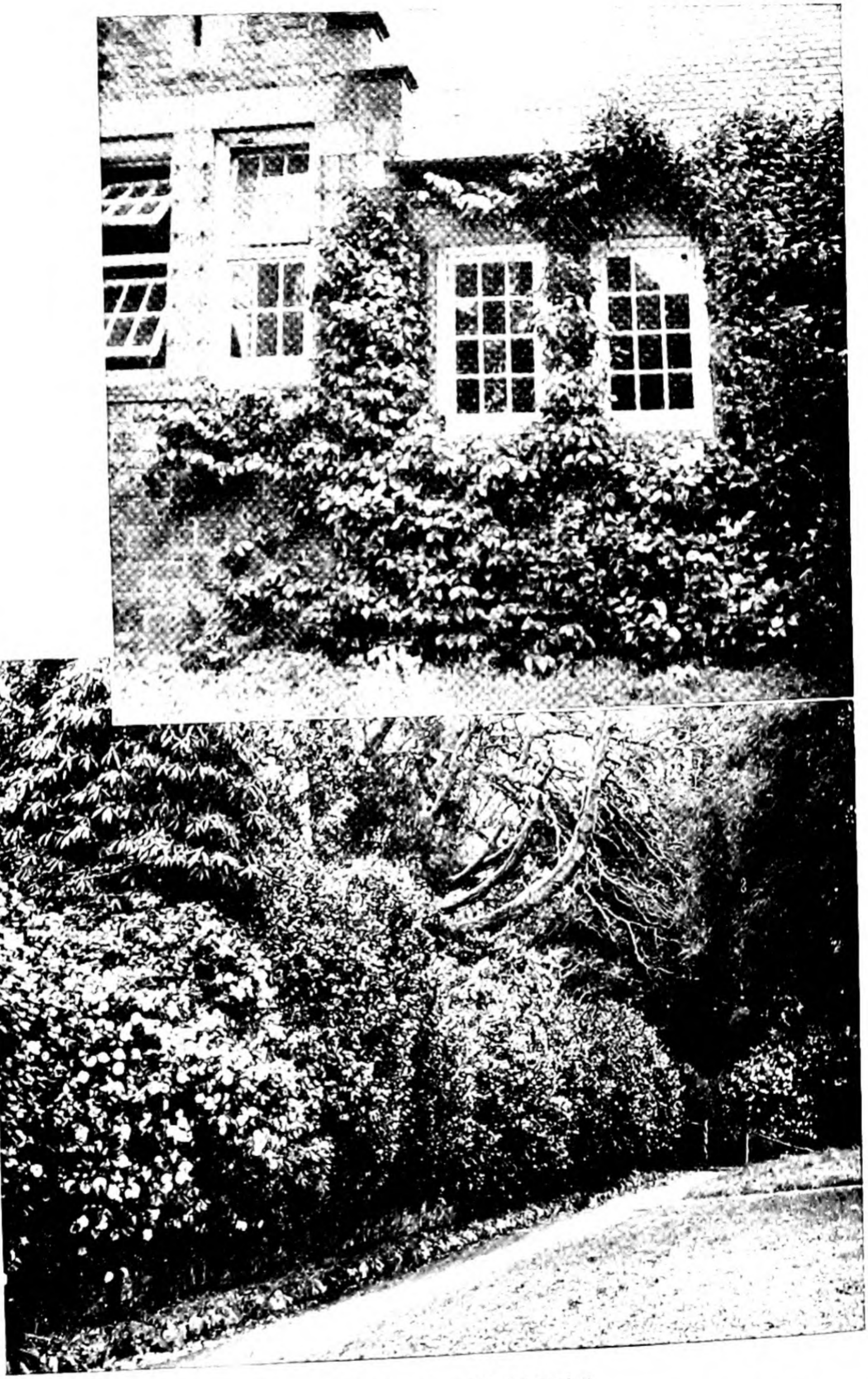
CAMELLIA JAPONICA, VIRGINS BLUSH



HYBRID CAMELLIAS
Left: St. Ewe. *Right:* Donation.



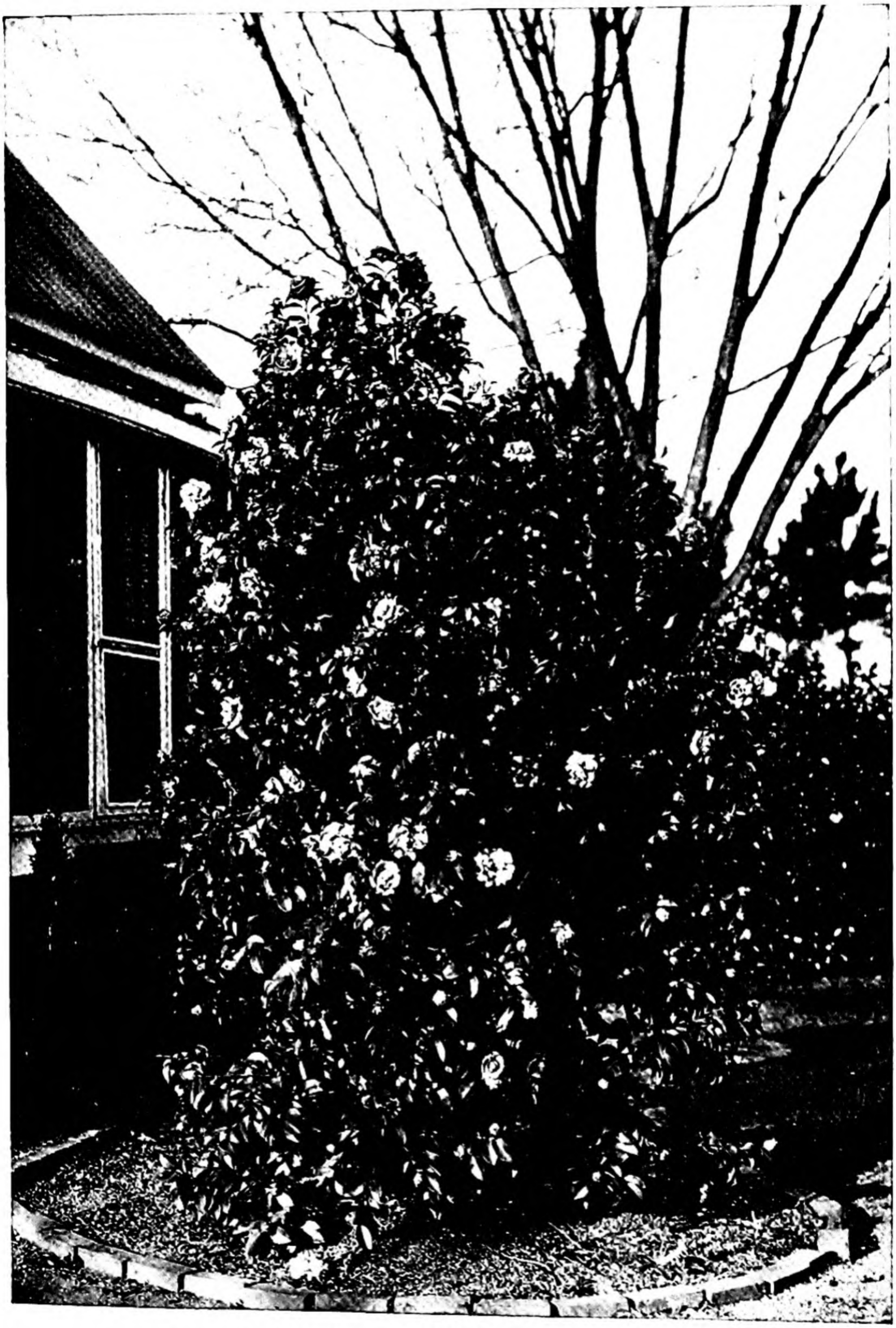
TWO HYBRID CAMELLIAS AND SEEDLING C. RETICULATA
Left: J. C. Williams. *Center:* Cornish Snow. *Right:* Reticulata Seedling.



CAMELLIAS ON WALLS

Upper: *Camellia japonica* trained on wall, Samaurez House, Samaurez Park, Guernsey

Lower: Camellias on the wall, Scorrier House, Cornwall



CAMELLIA JAPONICA, ELEGANS
Specimen in Perry, Ga.



CAMELLIA SINENSIS
Tea plant in garden of Dr. and Mrs. Robert McKay, Charlotte, N. C.



CAMELLIA JAPONICA, HERME
Specimen in Perry, Ga.



CAMELLIA JAPONICA, EUGENE LIZE







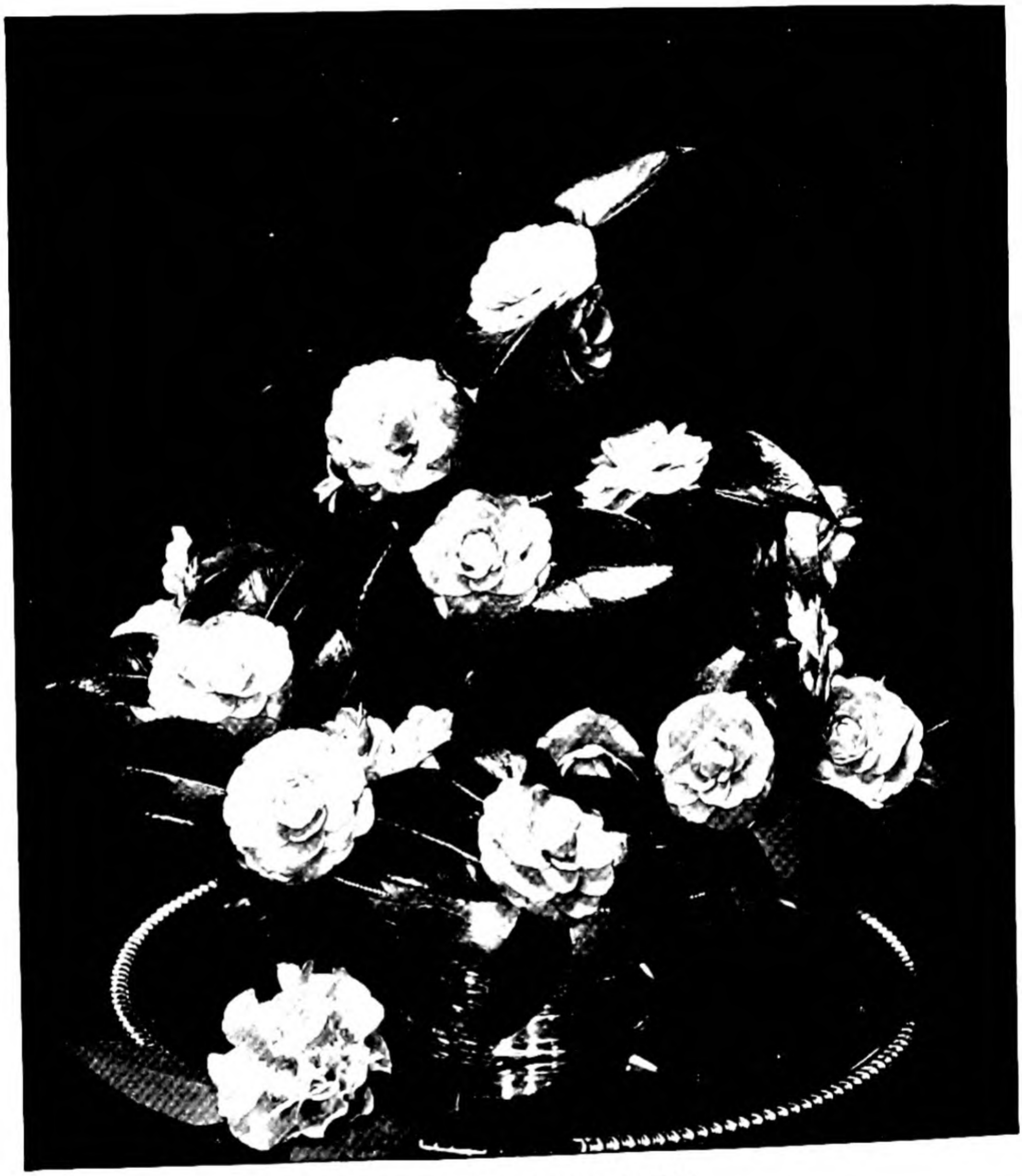


CAMELLIA DISEASES

Top, Left: Normal camellia bloom; *Right:* Bloom diseased with flower blight (after Hansen and Thomas)

Center, Left: Sunburned leaves; *Right:* Leaf gall

Bottom: Virus-variegated camellia leaves



A CAMELLIA BOUQUET
Camellia flowers are unsurpassed for house decoration

pots or in the ground, camellias are surpassed by no other woody, broad-leaved evergreens.

Satisfactory results can be had by keeping camellia plants in pots or by growing them in the open ground of a greenhouse, but at the same time each of these plans has its advantages. Some commercial producers of camellia flowers for the florist trade grow their plants in open beds, while others handle them in pots. Plants in pots can be kept within smaller space and more specimens can be grown in a given area than if they are planted in the ground. Pot-grown plants can be used for decorative purposes in various places, and it is possible to maintain greenhouse collections in better appearance by moving specimens about as desired and replacing them when they are through flowering. Uniform conditions of moisture and fertility are more difficult to maintain in pots than in the open ground, but alkalinity and other unfavorable conditions in the soil are easier to eliminate.

Pots or open ground

By planting in open ground it is easier to keep both soil fertility and moisture at optimum levels. Specimens can be grown to larger size, and a mulch can be used to supply acid and to help in maintaining uniform soil conditions. Plants grown in open ground will require more attention to pruning and training to keep them within bounds, and at times it may be necessary to head them back to keep them within the confines of a greenhouse. A combination of pot-grown specimens with plants in open ground can be used to advantage —smaller specimens in pots, larger ones in the ground. In a general way, management of plants will be about the same under both plans; they will require about the same care and attention. Potted camellias make excellent decorative plants for various uses either as good evergreens or when in bloom, and they may be

grown in gardens in the warmer areas. In regions where winter temperatures are suitable for growing camellias out-of-doors but other factors of environment are not, pot culture can be used to overcome undesirable conditions. Soil can be made to order. A slat house or shed will give the necessary shade or fast-growing trees can be planted to provide it; daily or more frequent syringings will take care of humidity, particularly during periods when the air is dry.

Containers

Various kinds of containers can be used. Flower pots glazed and unglazed, cement pots and boxes, cans, drums, boxes and tubs made of rot-resistant woods such as heart cedar, cypress or redwood all have their place. Different sizes are needed. Pots or containers of various shapes and made of different materials do not add to the appearance of a camellia collection. A motley assortment is to be avoided. In different sizes they will look better if they conform to the same general pattern or shape. None are better than good clay pots, but unfortunately they are usually not obtainable in sizes larger than sixteen inches. Pots and boxes made of cement look well and are satisfactory. They are open to the objection of heavy weight, but light pots of large size can be and are being made of cement. Whatever kind of container is used, it should be provided with ample drainage openings; for tin cans it is best that the holes be placed around the outside of the cans, just above the bottoms. Tin cans should be dipped in or painted with asphalt paint to reduce or prevent rusting. Wooden boxes also should be painted on the inside to offset decay. Fortunately camellias are so well adapted to potting that they can be grown to large size and kept for years in relatively small root space.

To some extent the materials used in making up

a soil in which to grow camellias in greenhouses, whether in pots or in open ground, will depend upon what is available locally. Camellia soil should be acid, rich in nutrients, well supplied with organic matter, friable (crumbly) and open. Alkaline soils and those that are compact and sticky are to be avoided. If required in quantity, a compost made up of equal parts by bulk of sod from acid grassland, woods mold and stable manure is excellent. These materials can be stacked in alternate layers and allowed to stand for a year at least. Sometimes it is recommended that the compost pile be turned over and mixed several times during this period. This is not necessary, for it can be cut down and run through a soil shredder after a year, as needed. This mixes the original materials thoroughly. To three parts of this compost after mixing, add one part made up of equal amounts of coarse acid peat and sharp acid sand just before using. The resulting mixture will be loose but retentive of moisture because of the vegetable matter in it, and at the same time it will drain readily. It is essential that the soil used for pot and greenhouse culture contain more nutrients than are required for plants in gardens because their root systems are more restricted. To this end it is sometimes advisable to add small quantities of commercial fertilizer to the compost before using. A four-inch potful to a wheelbarrowful of soil will be helpful in this connection.

Soils for greenhouses

The best time to repot camellias is immediately after they have finished flowering and before growth starts. In the case of late-blooming sorts this is a very brief period, while early-flowering varieties have a much longer rest before new growth begins. Consequently, repotting of a collection of varieties blooming at different seasons can be extended over a considerable length of time.

Repotting

That camellias can be grown and maintained in small pots does not mean that the roots of large plants can be squeezed into small containers to begin with. They must be started as small plants in small pots and then shifted to larger ones from time to time until the ultimate or final size is reached. It is, of course, possible to start and grow a small plant in a large container if particular attention be given to drainage and watering. Drainage must be ample, and watering must be done carefully to supply what is needed and at the same time to avoid overwatering. Starting with cuttings taken from the rooting media and placed in three-inch pots, the next transfer will be to five-inch pots, then to eight inches and finally to twelve inches, sixteen inches or larger. In twelve-inch pots they can be kept for five or six years and in larger pots or boxes many years more. The various sizes from three to twelve inches may cover a period of twelve years or more, after which boxes or tubs usually are used.

Size of pots

The amount of drainage material consisting of broken pots, crushed granite or gravel, all of which should be lime-free, placed in the bottom of a pot should be in proportion to the size of the pot and not to the size of the plant. A three-inch pot needs a single piece or two placed over the hole. A twelve-inch pot should have a depth of two or three inches. After the drainage material is in place, it should be covered with a thin layer of sphagnum moss, leaves or shavings followed by enough soil to bring the plant to the same depth it stood in the previous pot. The plant to be repotted is then taken out of its container and the soil around the top and bottom of the ball broken away and removed. The plant is placed in position in the new pot, and the earth is packed around it firmly so as to leave no air spaces. This is done by using a small

Drainage of pots

slat or paddle. When finished the pot will be filled within an inch more or less from the top. As soon as potting is completed, the specimens are watered and the pots placed on brick or other materials to raise them above the ground surface, to insure good drainage.

Pruning and drainage

When plants are being shifted from one container to another is a good time to take care of whatever pruning may be necessary. Dead and weak twigs should be cut out, heads thinned where necessary and the tops put in good order. In pruning no stubs should be left; they should be cut off smoothly and close to the branch or trunk from which they started.

It is not possible to grow camellias in soil over a period of years where drainage is inadequate. The site or location for a camellia greenhouse should be well drained. If drainage is not provided naturally and it is not possible to secure satisfactory drainage otherwise, a flat elevated area may be built up and the greenhouse placed on it. The alternative to this plan is to raise the level of the area inside by filling in with good soil. Planting in the ground in a greenhouse does not differ materially from planting in a garden. The same plan is followed and the same precautions are taken to give the plants a good start.

Fertilizing greenhouse plants

Already the need for rich, mellow soil for use in potting and planting camellias in greenhouses has been emphasized. After they are potted or planted out, they will not need fertilizer for some time; but later on it will be advisable and necessary to make applications if the plants are to be maintained in good condition. In pots, plant nutrients are never available in large amounts and, therefore, attention must be given to feeding them from time to time. It must be kept in mind that the root space is restricted, and caution must be exercised in the quantities used. It

is better always to underfeed rather than overfeed. Fertilizer in small amount can be scattered over the surface or it can be dropped in small holes made with a sharp stick to a depth of three or four inches, or it can be dissolved in water at a rate of one ounce to two gallons and given in liquid form. When plants have completed their flowering is a good time to fertilize, and a second feeding may be given two months later, with a third in late fall before flowering of most varieties begins. The first application may consist of well-decayed stable manure applied to the surface of the soil in pots or beds, to be followed with commercial fertilizer for the second and third applications. Small doses of liquid containing fertilizer can be given from time to time; they are particularly helpful during the summer season when the flower buds are enlarging.

There is no better water for camellias than rain water, and in some cases it can be caught, stored and used. Its reaction is constant at pH 5.75. Water from

Kinds of water

lakes, ponds, streams and marshes in many parts of the country usually is good, but from deep wells is often unsatisfactory. It is hard because of the content of lime and other materials. Water from wells should be checked, and if it has to be used steps must be taken to make it suitable when it contains lime or other substances that may be injurious to camellias. The ill effects of alkaline water may be offset through the use of sulphur, sulphuric acid or aluminum sulphate. Sulphuric acid may be added to the water, while sulphur and aluminum sulphate may be scattered over the soil about the plants. (See Chapter 10.) Where water has to be modified by the addition of acid, it is best to consult a chemist as to the amount. The reaction of the water should not be higher than pH 7. If it is, and its reaction is not offset in some way, there

will be a gradual, slow change to an alkaline condition in the soil, to the injury of the plants.

Camellias require an even supply of water, and it is best that there be no variation in the amount available in the soil. Some of the difficulty with buds dropping is caused by wide fluctuations in soil moisture. There is, of course, danger of overwatering if the soil is close or heavy and poorly drained; but given an open, friable soil and good drainage, there is much less danger of overwatering to the extent of excluding air from the roots. The eye of the greenhouse grower should control the amount of water and see when to apply it. There is no fixed rule, but twice weekly is about right. In the warm weather of summer or when plants are in full bloom, three times a week may be advisable. It is preferable to water well and less frequently rather than to water often in small amounts. The best time under most conditions is in the evening. There is less loss from evaporation during the night.

Watering

Camellias respond to syringing. Only a small amount of water in a fine spray is necessary. All parts of the plants should be wet until the water begins to drip from the foliage. This practice reduces temperature, removes dust, helps control scale insects in the crawler stage, and is especially beneficial to camellias. When plants are syringed, the walks in the greenhouse should be wet down as well as the ground beneath the benches and wherever there are open ground spaces.

Syringing

Humidity in the greenhouse should be maintained at a high level. It is well to have a good hygrometer to check the amount, and it is best that humidity be maintained at 60 percent or above. Watering and syringing provide necessary water for air moisture; dry air is to be avoided.

For camellias high temperatures during the day

when development and maturation of flower and shoot buds are taking place in summer are best. For opening of flowers and production of fine blooms much lower temperatures are needed, and there should be little variation. Long experience in the handling of camellias in greenhouses by many growers indicates

Greenhouse temperatures

temperatures of 45 to 50° during daylight and 5 to 10° lower at night. At these temperatures flower buds come to full maturity; the flowers are well formed, firm and of high quality. Change from summer temperatures should be made gradually. Abrupt and wide variations may interfere with normal development of flower buds and even cause them to drop later on. After flowering is finished, temperatures should be raised to 55° at night and 65° during the day to bring the plants into growth. As time of flowering is related to the starting of growth in spring, it is possible to advance or delay the time of blooming by advancing or delaying the beginning of growth.

If camellias are grown in the ground of a greenhouse, special care during summer is necessary. The free movement of air is needed, and to maintain it the ventilators should be kept open. Conditions within the greenhouse should approximate those of the open air. Shading is advised. It can be secured by painting or whitewashing the glass or by using cheesecloth

Summer care

supported by wires. The latter plan is excellent, because it makes it possible to regulate the amount of light from time to time. Shade combined with humidity will prevent burning of the foliage by the sun. Camellias can be grown under conditions where no direct sunlight reaches them, but sunlight during the evening and early morning hours probably has advantages. Particular attention must be given to watering and syringing at this season. Soil moisture should

be kept constant. Potted plants may be moved into the open air as soon as danger of injury from frost has passed and placed in the shade of trees or otherwise provided with some shade. There they may remain until the cool nights of autumn come, when they should be moved back into the greenhouse.

Before being returned to the greenhouse for the winter, camellia plants should be carefully inspected for scale and other insects and such treatment given as is needed to clean them of these pests.

Commercial growers have their preferences among camellia varieties. Usually the plants in which they are interested are relatively few in number. This must be so always, because they are interested in quantity and because small numbers of flowers of many varieties are difficult to handle in the trade. It is not easy to change from one set of varieties to another, and only those of proved value should find a place. Consequently, there are many valuable varieties now unknown in the florist trade. Those who have an established business find it difficult to change. But those who are starting may well give consideration to varieties not now commercially grown. There are many things to be considered in selecting varieties besides the beauty of the blooms. Time of flowering, number of flowers produced, texture of petals, shade of color and other features are all important. The following is a list of tested greenhouse varieties: Alba Plena, Aunt Jetty, C. M. Hovey, Daikagura, Debutante, Elegans, Herme, Kumasaka, Mathotiana, Otome, Prof. C. S. Sargent and Purity. The amateur greenhouse grower, not concerned with financial returns from his planting, can add greatly to this list. He can give play to his preferences and enjoy his collection in a wider range of varieties.

Greenhouse varieties

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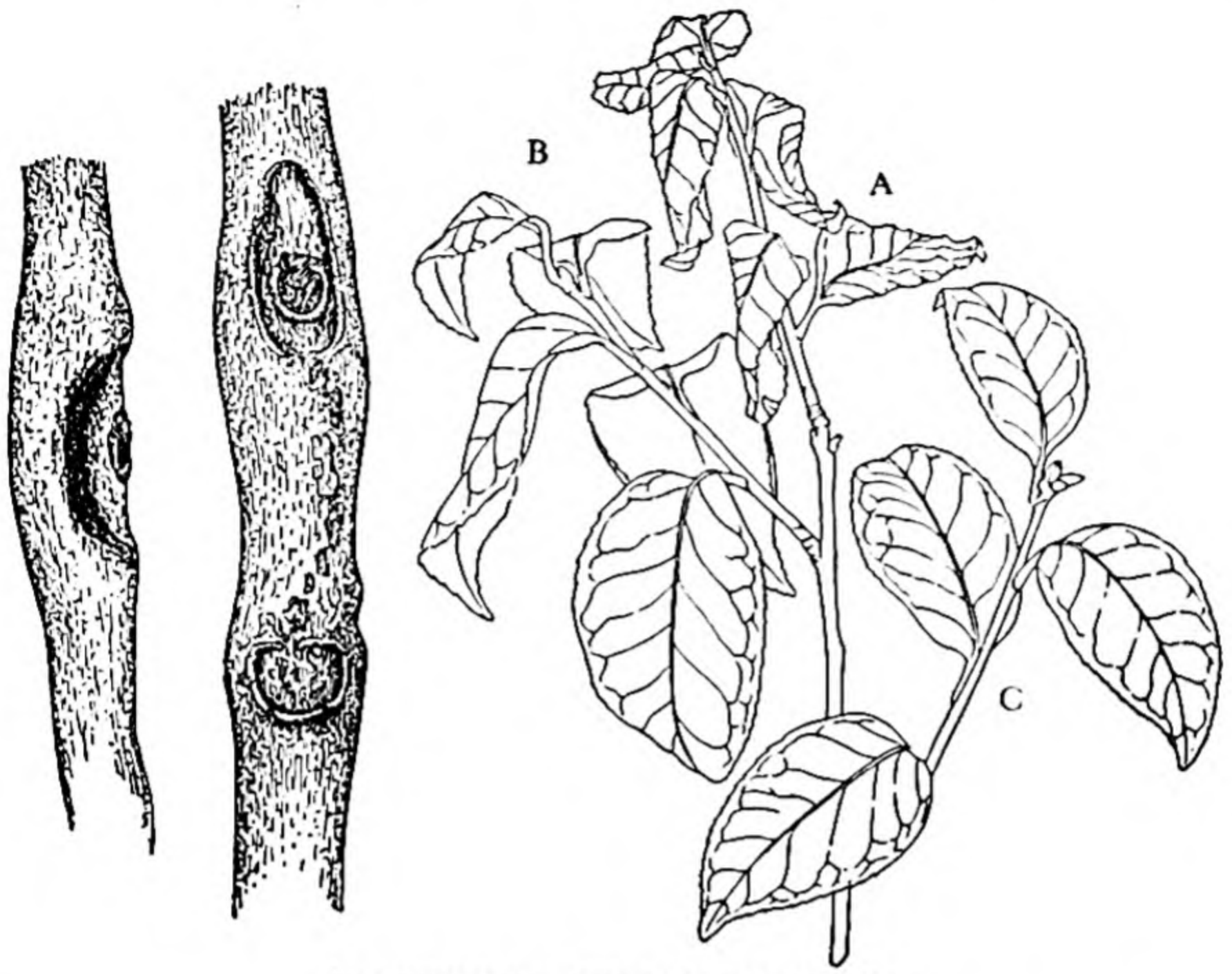
CAMELLIA DISEASES

CAMELLIAS are attacked at times by diseases—some of minor importance, others difficult to handle—but in spite of that they are grown and continue to produce fine flowers abundantly in gardens. The best thing a grower can do is to be acquainted with these diseases, to know what to look for, to know what may be expected, in order to be prepared to handle them if twigs, leaves and flowers are attacked. Throughout camellia-growing areas there is an awareness of camellia troubles, and usually help can be secured from one source or another if something new develops. At this time camellia problems are receiving the attention of trained scientists to an extent that augurs well for the future. Diseases and ways of controlling or avoiding them are being investigated.

There has developed among plant growers a belief that any and every plant disease can be controlled through the use of a spray of one sort or another. It is true that spray materials are very effective against some fungus diseases, but there are other ways of controlling them or offsetting their effects that for the camellia grower are more useful and helpful than spraying. Pruning, surgery, sanitation and, above all, good culture have an important place in avoiding disease troubles and in reducing their effects when they appear. It should also be kept in mind that fungicidal sprays are preventive and not curative, and plant surgery and pruning may be more effective in limiting the attack of a disease and getting rid of it.

Methods of disease control

Camellia twig blight, a disease to which the name dieback also has been applied, is characterized in the



CAMELLIA TWIG BLIGHT

Affected branch at right. (a) Central upper part dead. (b) Twig attacked, its upper leaves drooping. (c) Normal-appearing twig. Branches with canker areas at left.

Twig blight or dieback

early stages by a slight wilting of leaves on a twig or branch. An examination of the twig at this time shows discoloration of the normally white cambium just beneath the bark. Adjacent twigs or other parts of the plant are normal in appearance. As the infection progresses and the injury increases, wilting becomes more evident; the leaves droop, curl, lose their green color and take on a shade of brown. They are dead. Old leaves do not drop at once but remain hanging on the twigs for some time, but young tender ones are likely to fall immediately. By cutting into and lifting the bark at different points along the twig, the extent of injury can be determined. It goes as far as the cambium is discolored. It may extend from a twig into the

branch from which the twig starts, and even into the trunk itself. Unless checked, death of a considerable part of a large plant results, or the whole plant may be killed. Small specimens very frequently are killed outright. When the infection from the base of a small lateral shoot spreads into a larger stem, death of all parts above that point ensues as soon as the infection encircles the stem. A large part of a plant may be lost in this manner. If small twigs arising from a branch of some size are killed, in some cases the disease does not extend into the larger branch for any considerable distance. Instead, an oval area, of which the base of the twig is the center, is infected and killed, forming a canker on the side of the twig. This may remain active or it may die and dry up, leaving a scar on the branch.

Quite evidently infection by an organism of some sort and its active growth in plant tissues is the cause of the disease. In southeastern camellia areas where the disease is present, fungi belonging to three different groups, *Phomopsis*, *Diplodia* and *Gloeosporium*, have been isolated from active twig blight by Erdman West, who has been studying the disease, but up to this time it has not been determined which one or ones of these is the causative agent of twig blight.

Twig blight calls for a surgical operation. The diseased parts must be cut away until no discolored cambium or wood remains. This must be emphasized, because if diseased parts are not removed completely, the disease can continue and it will be necessary to repeat the operation. Spraying with a copper fungicide when new growth is starting may be helpful; but since the life history of twig blight is not known exactly, it is difficult to say how helpful spraying really is.

Control of twig blight

Camellia flower blight, caused by a fungus, *Sclerotinia camelliæ* Hara, is a disease of camellia flowers

apparently introduced from Japan some time prior to 1938. It is known to attack the blooms of *C. japonica* and *C. Sasanqua*, but the flowers of other species of camellia are also likely to be susceptible to infection. It has been found in gardens and nurseries at a number of different points. The fungus as it grows on camellia petals and in the flowers destroys their beauty and renders them worthless for decorative purposes. It has been studied by H. N. Hansen and H. E. Thomas, who at first thought the fungus was new to science but later found that it had been described in an obscure Japanese publication several years before. The following description of the disease and suggestions for its control are taken from one of their articles.*

Flower blight fungus

"The symptoms of the flower blight fortunately appear only on the flowers and not on any other part of the plant. Brownish spots appear, at first small but later involving the entire petal or flower, in which the veins in the petals stand out as darker brown than the surrounding tissue. This symptom is rather easily distinguished from frost injury usually restricted to the outer or marginal portions of flower or petals.

"In advanced stages, the flower blight fungus develops in the basal part of the flower to produce a firm, eventually black body in the lower part of the petal, known as a sclerotium; or the fungus may combine in the base of an entire flower to form a compound sclerotium.

"The infected flower often falls to the ground and may be covered by other flowers, by debris, or by an intentional mulch of peat moss or other material. Here the fungus may produce spores each year for at least three years in the spore-bearing cups called apoth-

Flower blight fungus spores

*Hansen, H. N. and H. Earl Thomas. Camellia Flower Blight. American Camellia Yearbook. 43–45. 1946.

ecia, which arise from the sclerotia. From January to April in central California these cups liberate spores which in turn are carried by air currents to newly opened flowers where the cycle of infection is renewed. A similar fungus has been shown to produce more than 30 million spores in a single apothecium. We have never seen leaves, stems, or roots become affected. Another fortunate feature is the lack of a 'repeating spore' stage. Thus the fungus is not able to move from a newly infected to a healthy flower during the same flowering season.

"Thus far the key to control seems to be the complete destruction of all infected flowers. This should be done thoroughly and promptly. If the affected flowers which eventually drop to the ground are not gathered carefully and quickly, some will inevitably become buried. Furthermore, it has been shown that a single infected petal which has become separated from the rest of the flower is sufficient to produce apothecia the following year.

"As stated above, the same lot of sclerotia (the larger ones) may produce apothecia for at least three successive years. For this reason a good deal of patience is indicated. The nursery with most experience in central California carried on a systematic program of gathering and destroying infected flowers for several years before a clear reduction in the amount of disease was evident. In 1945 and 1946, the number of infected flowers in that nursery was a small fraction of the number in earlier years. A smaller nursery achieved almost complete eradication of the fungus in one year by removal of all flowers and flower buds whether infected or not and replacing the top 2 to 4 inches of peat moss or gravel used in beds and containers.

Control of flower blight

"Preliminary tests by Dr. Cecil Yarwood indicated that

spraying just before the blossoms opened was of little value. Later work showed that the fungus was not able to penetrate the flowers until the petals were exposed. Since it is not usually feasible to spray open flowers with fungicides, this method of combating the disease does not seem promising. It cannot be entirely excluded, however, especially in view of the endless chain of new spray materials emerging from the chemical assembly line.

"Ground spraying to prevent the formation of apothecia has been suggested, and at least one material, Fermate, has been used in an experimental way. This is a promising possibility for the future but at present cannot replace prompt collection and destruction of infected flowers.

"Another aspect of control involves prevention of the introduction of the fungus into new areas. Such movement could most easily be effected by transport of plants in balls, cans, or boxes in all of which the infected flowers or petals might become buried. For the present, it would seem advisable that only cuttings or bare-root plants packed in clean soil or peat moss be moved into areas not known to be infested by the flower blight fungus."

Preventing spread

In some particulars this disease of camellia flowers resembles the flower blight of azaleas. But there is this difference in its life history. The fungus causing azalea flower blight produces a second kind of spores on the flowers, and these spores carry infection directly from one flower to another. Such spores are not produced by the camellia flower blight fungus.

Camellia cuttings and seedlings are often destroyed in propagating beds and frames by the fungus *Rhizoctonia* sp. Leaves close to the surface of soil or rooting medium are first affected. As the trouble spreads, dead patches of cuttings or seedlings are formed. The

fungus produces a cobweb-like growth of fine threads that spreads among the leaves and twigs and kills them. Dead leaves and twigs are held together by the fungus. If left unchecked, the disease is capable of doing serious damage, even to the extent of killing all the plants in a bed as it spreads among cuttings or plants. Spread of the fungus can be prevented by using a solution of wettable spergon, two ounces to three gallons of water, and thoroughly wetting the plants and soil with it.

Rhizoctonia

As a safeguard against the disease it is best not to use a rooting medium a second time, and propagating boxes and beds should be emptied, cleaned thoroughly and treated with a disinfectant before being planted again. Commercial formaldehyde at the rate of one gallon to fifty gallons of water makes a good disinfectant for this purpose. The wood of boxes and beds should be thoroughly soaked with it, covered up with paper or burlap and allowed to stand for two days or until all odor of formaldehyde has disappeared.

Here and there throughout southern areas, camellias sometimes are attacked by a root-destroying fungus, clitocybe root rot (*Clitocybe tabescens* (Fr.) Scop. ex Bres.). There is usually no indication of its presence until a plant or part of one dies. In the latter case the disease will usually progress until the whole plant is destroyed. This may take some time. The fungus, a parasitic mushroom, grows in the roots and destroys them. A white web-like growth (mycelia) invades the larger roots, girdles them and makes it impossible for them to function. Sometimes fruiting bodies (mushrooms) attached to the crown of the shrub are produced just at the ground. These grow in clusters, are light honey-yellow in color and have curved stems (stipes). Since there is no warning of an attack by this fungus and there is little chance of

Root rot (clitocybe)



CAMELLIA SASANQUA, HIODOSHI

doing anything for a plant once infested, nothing can be done to save it.

The fungus attacks the roots and crowns of a large number of trees and shrubs throughout the sections where it occurs. Peaches, plums, pears, oaks, cherry-laurel and other trees are among its hosts. Large trees may survive for many years after they are attacked, but small trees and shrubs are destroyed quickly—that is, in one to three years—because their root systems are small and limited in scope. Infection of camellia root systems may come from pieces of diseased tree roots left in the ground when the shrubs are planted, or infested roots belonging to an adjacent tree may come in contact with the camellia roots. In gardens where clitocybe is present, great care should be exercised in planting to see that no diseased roots are present from which infection can come. Where plants have been killed by clitocybe and are to be replaced, no pieces of infested roots must be left in the soil from which the dead plant has been removed. As an additional safeguard against reinfestation, a large hole should be dug and only new soil used in setting another plant.

Hosts of clitocybe

A root rot of camellias caused by the fungus *Phytophthora cinnamomi* Rands has been studied by D. L. Gill of the United States Department of Agriculture. His findings have been reported in the American Camellia Yearbook, 1948. Young plants, the root systems of which are attacked by the fungus, are stunted and unhealthy in appearance. Leaves become yellow and drop off; they wilt and die. Brown, necrotic areas are found on the roots, especially the tips, where they are attacked by the fungus. Root systems of young plants finally are destroyed. Older plants become unhealthy, branches die out as the disease progresses, and finally whole plants succumb. The disease has caused serious

Phytophthora root rot of camellias

losses in propagation frames and beds. Japonica varieties vary in their susceptibility to attacks of the fungus. Some varieties, such as Frau Minna Seidel and Herme, are very susceptible, while Debutante, Prof. C. S. Sargent and others appear to be more resistant. Sasanqua varieties also seem to be more resistant. Wet and constantly damp soil is favorable to the growth of the fungus. Good drainage, repeatedly emphasized in the culture of camellias, will help in preventing inroads of the disease. Hence it is clearly indicated that in propagating and growing young plants, poorly drained locations should be avoided. The fungus attacks a number of other plants, and indications are that it may be fairly widely distributed. Losses in transplanting plants with even slightly affected root systems may be heavy. Apparently some control of the fungus in soils has been obtained by soaking them with diluted formaldehyde, one gallon to 100 gallons of water. The soil should be covered with paper or burlap for forty-eight hours and then not used again until all odor of formaldehyde has disappeared.

Shoot gall

Camellia shoot gall, sometimes also referred to as leaf gall, caused by *Exobasidium camelliæ* Shirai, is a fungus disease of young camellia shoots and leaves as they start into growth in spring. Essentially it is a disease of *C. Sasanqua* varieties. Rarely has it been found on varieties of *C. japonica*, and there is some question whether the disease on varieties belonging to the latter species is caused by the same fungus. It may be that the one attacking *C. japonica* is different from the other species. However, the general effects are the same. The disease is characterized by a thickening and enlargement of the leaves attacked. Lengthening of the shoot is stopped and the leaves become much longer and wider, thickened and flesh-like. At first

the affected, thickened leaves are pale green; later they become white on the undersides through the presence of countless spores by which the disease is spread; finally the diseased leaves grow dark in color and then dry up. The spores, scattered by wind and water, apparently find lodgment on those buds from which the next season's growth will start. There they may infect the bud tissues and remain dormant until the following spring, when they grow and develop along with the new shoots. There is no evidence that the disease is transferred from one shoot to another as or after new growth starts. Usually infestation is light, only a shoot here and there being affected, though on a large plant there may be quite a number of galls. The first step in control is to cut off and burn the galls. This should be done before they form spores, and to this end the plants should be examined carefully several times as new growth is developing. Spraying new growth with a copper fungicide such as Bordeaux may help in controlling the disease.

Shoot gall control

Sunburn is marked by brown discoloration of the upper surfaces of leaves. There may be very light brown discoloration indicating a minimum of injury, or there may be deep brown color as a result of greater damage. In all instances, however, leaves have the appearance of having been scorched by a flame. Burning may go so far as to cause complete death of leaf tissues, in which cases brown color shows through on the under surfaces of leaves. The amount of injury depends in some measure upon the position and exposure of the leaves. The areas usually harmed are the central curved parts, because they are more nearly at right angles to the sun's rays. Leaf tips and bases, usually depressed or bent downward, escape damage. In severe cases, twigs are sometimes burnt and turned

Sunburn

gray on the upper or exposed surfaces. Injury of the same sort may be caused by winter frost followed by strong sunlight.

The direct cause of sunburn is the intense heat of the sun's rays, but there are predisposing conditions in the plant that render leaves susceptible to injury. It takes place under a combination of conditions that include reduction of moisture in leaves by active transpiration, deficiency of soil water, low humidity, high temperatures and cloudless skies. There are indications that spraying with an oil emulsion may predispose foliage to sunburn, even though the spray may have been applied several days or even weeks in advance of burning becoming noticeable. Sunburn becomes evident in May and June in some sections.

Avoiding sunburn

Clearly, avoidance of this injury to camellia leaves lies partly in proper attention to watering and syringing so that sufficient moisture may be available for the plants and humidity surrounding them may be maintained at a high level. Syringing very early in the morning or late in the evening also is helpful in reducing plant temperatures. It is well to remember that, in a wild state, camellias are shrubs in open woods where they are shaded, and in choosing a location for them in areas where sunburn is likely to occur, it is well to choose, if possible, one where shade will be provided during a few hours, at least in the middle of the day. Leaves of plants in sufficient shade are not subject to sunburn. If it is advisable to provide shade temporarily, it may be done by using cloth on stakes, or the tops of trees and branches may be stuck in the ground in such position as to cut off the rays of the sun during that part of the day when they are most direct and intense. Plants grown in shade need protection when transplanted in sunny locations.

Leaf spots in the form of well-defined grayish areas often follow sunburn. In some cases these dead areas drop out, leaving holes in leaves. Where the dead leaf tissue remains in place, tiny dark dots are often present. These are the fruiting bodies of a fungus. On leaf areas injured by the sun and sometimes by frost when drops of water are frozen on a leaf surface, two fungi, *Gloeosporium* sp. and *Pestalozzia* sp. are often found. These are saprophytes or weak parasites that do not affect leaf tissues unless they have been injured by some condition and the way prepared for them to take hold. There is no reason for being alarmed about such spots. They do not spread, neither will they occur again unless the leaf tissues have been injured and conditions provided for the entrance of the fungi. Overcoming or preventing such trouble consists in protecting the foliage against sunburn and frost injury.

Fungi on sunburned areas

Variegations in camellia leaves may be traced to one or more of three different causes. They may be genetic or hereditary and originate from seed. They may be chimeras caused by two different kinds of genetic cells originating in a growing point and producing tissues of different colors. They may result from infectious chlorosis, a disease brought on by the presence of a virus that destroys the chlorophyll. While one or more of these factors can affect the color of leaves, variegations are more often caused by the presence of a virus than anything else. Lack of color follows no distinct or definite pattern, and the amount of leaf surface showing variegation may and does vary greatly. Virus infection is indicated by a yellowish green mottling of all or part of a leaf; there may be only a few light yellow spots or dots in others, or a large part of a leaf may be yellow and in some cases entire leaves may be yellow, all chlorophyll having

Camellia leaf virus

been destroyed, with the result that they are completely etiolated.

Little attention has been paid these variegations by camellia growers; they have been accepted as normal. But Milbrath and McWhorter* have proved that they are caused by a virus and that the virus can be transferred from one plant to another by bringing affected cells in contact with healthy ones as in grafting. If a scion from an infected plant is grafted on a virus-free stock, the disease can be transmitted to the stock; or if a virus-free scion is grafted on an infected stock, the virus will show up in growth produced from the scion. They also found that it can be continued from one generation of plants to another through cuttings. The disease is not carried through seeds, and seedling plants are free from it unless or until they are infected from diseased plants in some way or other. It may be that the virus is transmitted by insects, but so far no insects have been incriminated. So far as known, all varieties of *C. japonica* are subject to leaf virus. It is probable that some are more susceptible than others. Among those noted showing large amounts of leaf variegations at times are Alba Plena, Kumasaka and Nagasaki. Plants of Alba Plena have been noted many times that showed no signs of leaf discoloration. Such plants should be selected as scion sources, and in grafting they should be grafted only on virus-free stocks.

Dodder and its control

Dodders, *Cuscuta* spp., are slender, parasitic, seemingly leafless vines native in parts of America, which attack many kinds of plants, both herbaceous and woody. Though there are several species recognized by botanists, they all behave the same way and usually they are found growing in moist places. A dodder con-

*Milbrath, J. A. and F. P. McWhorter. Yellow Mottle Leaf, a Virus Disease of Camellia. American Camellia Yearbook. 51–53. 1946.

sists of numerous orange or greenish yellow strands that grow rapidly, forming dense masses around, through and over the plants they infest. On these cord-like vines, flowers in bunches or masses are borne and seed is produced freely in a very short time.

From these seeds new dodder plants are produced in spring, which at first are normal plants with roots and growing shoots. The young vines twine around close-at-hand plants. On the vines special organs (haustoria) are developed that grow into the infested host plants and suck out their juices for the nourishment and growth of dodder. True roots in the soil are no longer necessary, and they have disappeared. With the production of flowers and seed the growth cycle of the vine is completed, and in the camellia areas the old vines die in early autumn to be replaced the following spring by a new crop of dodder seedlings. Dodder seed may be brought into a camellia planting with soil used in setting plants. Control consists in thoroughly removing the vines, even to the smallest pieces, and preventing flowering and seed formation.

Keeping the ground around young camellia plants in propagating beds cultivated frequently in spring, will prevent the young dodder seedlings from reaching the branches of the camellias. Dodder parasitizes only succulent green stems and not well-ripened wood.

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INSECTS AND MITES

INSECTS of a number of different kinds attack camellias. Some of them are naturally associated with these plants and have gone with them into most parts of the world where they are grown. They have traveled with and on them. There are other insects found only here and there that also attack camellias. Some of these live on related plants and transfer their attention to camellias when they are introduced. Insects of a third group are general feeders that find camellias acceptable food. These are more or less localized, and their kinds and the damage they cause vary from one region to another.

An understanding of insects—how they feed and live—and a knowledge of their life histories are essential for effective control. Usually in the life cycle of every injurious insect there is a time or stage when it is more easily controlled or destroyed than at any other time. That, of course, is when it can be attacked most effectively. For control purposes insects may be divided roughly into two groups; the means used against one group may or may not be effective against the other.

Insect feeding habits

I. Chewing insects. These secure their food by actually biting away parts of plants and swallowing them, much as higher animals do. To this group belong beetles, grasshoppers, katydids and the larvæ (caterpillars) of various moths and butterflies.

II. Sucking insects. These feed on the juices of plants. Most of them are provided with tiny sucking tubes that they insert into the tissues of plants and through which they suck plant juices. A few rasp and roughen the surfaces of leaves to reach the juices

beneath. Included in this group are various scale insects, aphids and a few less important insects. Here, too, are placed the mites which, though not insects, are controlled in much the same way.

When the margins of camellia leaves are eaten away or holes are eaten in them, it is certain that some kind of chewing insect, either in adult or larval stage, is the culprit. Close examination of the plant may disclose it. Sometimes it may be at rest on a twig or the underside of a leaf. More often no insect is found, but examination the following day reveals extended injury, indicating that the damage is done at night. Against such insects it is usual to employ a poison that may be ingested with their food. Arsenic applied as a dust or spray is effective, and it must, of course, be diluted with a carrier.

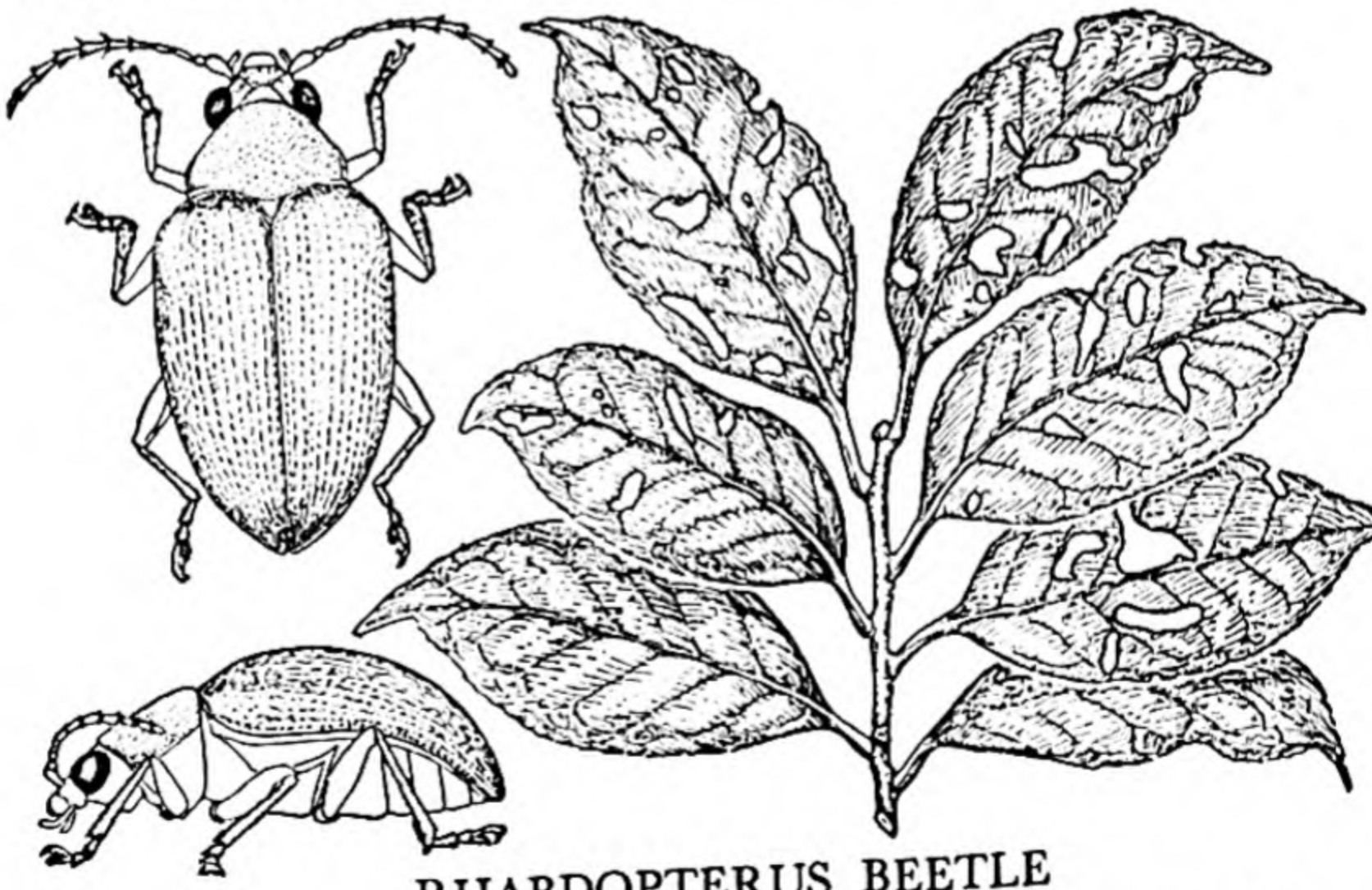
S. A. T. dust, made by mixing five parts dusting sulphur, one part powdered arsenate of lead and four parts nicotine sulphate dust, is very useful and effective. It will give control of chewing insects, mites and aphids if applied twice weekly over a period of three or four weeks when they are active.

In addition to the older materials such as sulphur, tobacco and arsenic, there are new insecticides like parathion and chlordane that have proved to be effective against certain insects, and while their insecticidal values have not been determined, they are well worth trying. There are indications that under some conditions and for some camellia varieties D.D.T. is toxic; it should be used with caution, if at all. Insecticides

In southeastern and southern camellia areas of the United States, leaves of camellias, in particular varieties of *C. japonica* which appear to be preferred hosts, sometimes are damaged by nocturnal leaf-eating beetles of the genus *Rhabdopterus*. Three native species, *R.*

prætextus (Say), *R. picipes* (Oliv.) and *R. deceptor* (Barber), have been captured while feeding on camellia leaves or otherwise have been incriminated. *C. japonica* is the most common and abundant host, but *C. reticulata* though much less usual is also a favorite; although varieties of *C. Sasanqua* are attacked, they seldom show so much injury to foliage even when adjacent to other species that are damaged. These beetles attack the leaves of a large number of other plants, mostly trees and shrubs. Judging from the injury to its foliage, *Gordonia lasianthus*, a camellia relative found native from North Carolina into Florida and westward into Louisiana, is a preferred food plant for species of *Rhabdopterus*, since typical injury to its leaves has been noted in many different places. Dr. A. N. Tissot and Dr. L. C. Kuitert of the Florida Agricultural Experiment Station have collected specimens of *R. picipes* feeding on Gordonia foliage. It is very probable that other species of *Rhabdopterus* feed on the leaves of this tree wherever the tree and the beetle are present in

Leaf-eating beetles



RHABDOPTERUS BEETLE

Left: Back and side view of beetle enlarged five times
Right: Camellia twig with damaged leaves, ½ natural size

the same area. These beetles feed only at night and spend the daylight hours on the ground beneath leaves and trash. They are shining, dark bronze, almost black with a metallic sheen, about one-quarter inch long and one-eighth inch wide. Holes, some circular, others oval or elongated and usually curved, are cut in the leaves by the insects as they feed. These holes follow a characteristic pattern, so much so that the work of the beetles can be established quite definitely by the pattern and shapes of the portions of the leaves eaten out. If the beetles are numerous they can severely injure camellias, particularly small plants, even to defoliation. Leaves are attacked in spring as soon as they begin to unfold, and the beetles continue to feed during the period when the foliage is young and tender and before it hardens. Mature leaves are not attacked, though holes can be found in leaves of previous years as they persist on the plants. S. A. T. dust or lead arsenate dust will give control. The best time to apply it is just before dark, and if washed off by rain, it should be applied again. It is necessary to keep the foliage well covered for a few nights when the new growth is coming out.

Several different insecticides have been tested by Dr. Kuitert for control of leaf-eating beetles. Among these toxaphene was found to be especially effective. It was used at the rate of one ounce of 40 percent wettable powder to two and one-half gallons of water. Since toxaphene does not mix readily with water, it is best to mix the powder thoroughly in a small amount of water before mixing in the sprayer with the whole amount. Both foliage and the mulch about the plants in which beetles might be hiding were sprayed. Treatment was found to be effective for about two weeks.

Sucking insects can be destroyed by insecticides

that kill on contact or that give off fumes or gases and act as fumigants. For the control of various scales, a white oil spray such as Florida Volck is most commonly used. Nicotine sulphate in dust or liquid form is effective against aphids, and sulphur will take care of mites. Pyrethrum and rotenone insecticides also give excellent results and may be used in combination with other materials.

Control of sucking insects

Mites are capable of severely injuring camellia leaves, thereby reducing growth and the beauty of the plants. Several different kinds of mites, often referred to as red spiders, attack camellias. Perhaps the one most commonly found is the red mite *Paratetranychus ilicis* McGregor, and it may be taken as representative of other species. Mature scale insects are fixed in place, but mites move about. The first indication of their presence is along the midribs of the leaves, but later the whole surfaces may be involved. As the mites multiply and feed, the leaves become grayish tan in color, and if their attacks go on long enough they appear dead. Really they are not dead, but they have been injured severely and their functioning as normal leaves is greatly reduced. Mites feed by biting away the leaf surfaces to get at the juices within. They are very small and appear to the unaided eye as minute red specks. Only when magnified can their form and peculiarities be made out. They are oval in outline, reddish in color, and their legs are eight in number instead of six, as found on insects. Eggs are laid on both surfaces of leaves but the undersides are preferred. From these the young are hatched, move from place to place and begin feeding at once. Since they reach maturity in a week or so, the population can and often does build up very rapidly. Dry weather favors their development, rainy weather checks them,

Mites

and thorough syringing is helpful in reducing them, but the best control is secured by spraying or dusting.

The red mite increases rapidly in number during the cool weather of winter. Against this particular mite at that season of the year, satisfactory control can be obtained by using a spray containing parathion. When temperatures are high enough (80° F. or over), sulphur can be used very effectively against them. At such temperatures the sulphur gives off fumes that destroy the mites. Two dustings with S. A. T. dust with an interval of ten days gives good results. It must be remembered, however, that normal color will not be restored in damaged leaves, and effective control can be had only by timely use of insecticides.

Aphids, known also as plant lice, are small soft-bodied insects that attack new leaves and shoots of camellias and feed by sucking juices from them. Usually they are found close together in colonies or groups of considerable size. As a result of their attacks, tender leaves and new growth are malformed, distorted and stunted. In some parts of the country, colder ones in particular, aphids are carried over from one season to another in the egg stage. In spring as new growth starts on plants, the eggs hatch, the young feed on tender shoots and leaves and mature quickly. In warmer regions where camellias grow, the aphids produce living young throughout the year, and infestations on camellias usually are started by winged females that come from other host plants close by. Under favorable conditions their numbers increase rapidly. The new growth upon which they feed is injured, and growth is stopped. The black citrus aphid, *Toxoptera aurantiæ* (Fonsc.), small, brownish black or black in color, is the one commonly found attacking camellias. Ants are usually associated with them. They feed upon the

Aphids

honeydew produced by the aphids, and in turn the ants give the aphids some protection. They are subject to the attacks of several enemies that help to hold them in check and, fortunately, they are easily destroyed by spraying or dusting with nicotine sulphate. The chief difficulty is in reaching them, since they are protected by the curled and distorted leaves. New growth, particularly in early summer on young plants, should be carefully watched so that aphids may be controlled promptly if they appear.

Scales on camellias

Although Morrison* lists upward of thirty different kinds of scale insects as having been found on camellias, the ones that are really important because of the damage they do, are much fewer in number. Moreover, control methods recommended for the more harmful ones also will take care of others should they be present. Five species make up the more injurious group: (1) *Parlatoria camelliæ* Comstock for which Morrison* has suggested the common name camellia parlatoria because the name camellia scale, sometimes given it, also is applied to other species, (2) *Lepidosaphes camelliæ* Hoke, the camellia scale, (3) *Chrysomphalus aonidum* L., the Florida red scale, (4) *Fiorinia theæ* Green, the tea scale, and (5) *Pseudaonidia pæoniæ* Cockrell, the peony scale. All of these are called armored scales because they are protected at maturity by shell-like coverings. Beneath these the females live, feed, lay their eggs, and then die. When the eggs hatch, the young, commonly referred to as crawlers, move about for a short time until a suitable feeding place is found; there they settle down, begin feeding through their sucking tubes thrust into the plant tissues, develop the protective covering, and there-

*Morrison, A. E. Insects Infesting Camellias. Bul. State of California Dept. Agr. XXXV. 3. 131–140. 1946.

after remain fixed in one place. They do not move about again.

The tea scale, *Fiorinia theæ*, is a serious camellia pest capable of doing much damage. Varieties of *C. japonica* are favorite hosts, while those belonging to the species *C. Sasanqua*, though attacked, are not so heavily infested or so seriously injured, according to observations made thus far. This scale attacks leaves and for the most part is found on their under surfaces only. Occasionally they are found on the upper surfaces of leaves in dense shade or where a leaf lies close on top of another. Two features distinguish this scale from others found on camellias. The uppersides of infested leaves show irregular yellow spots, their size and shape corresponding to the areas on the lower surfaces where the scales are located. They are prone to congregate in patches. Nearly the whole upper surface of a leaf may be discolored, the amount depending upon the number of scales present on the lower side. Wherever the yellow areas are found, the chlorophyll of the leaves has been injured and it can no longer function in providing food for the plant. Later these affected areas become brown and finally completely dead. A second telltale characteristic of these scales is the matted, cotton-like substance with which they cover themselves. This covering affords additional protection. The male scales are small, soft and white; the female scales are dark brown, ridged down the center, about 1.5 mm. long and oval in outline. Eggs to the number of ten to fifteen are laid by the females underneath their coverings. These hatch within one to three weeks, depending upon temperature, and the young are matured in six to nine weeks. The broods overlap throughout the summer. Reproduction is slowed down greatly in winter. Control is gained

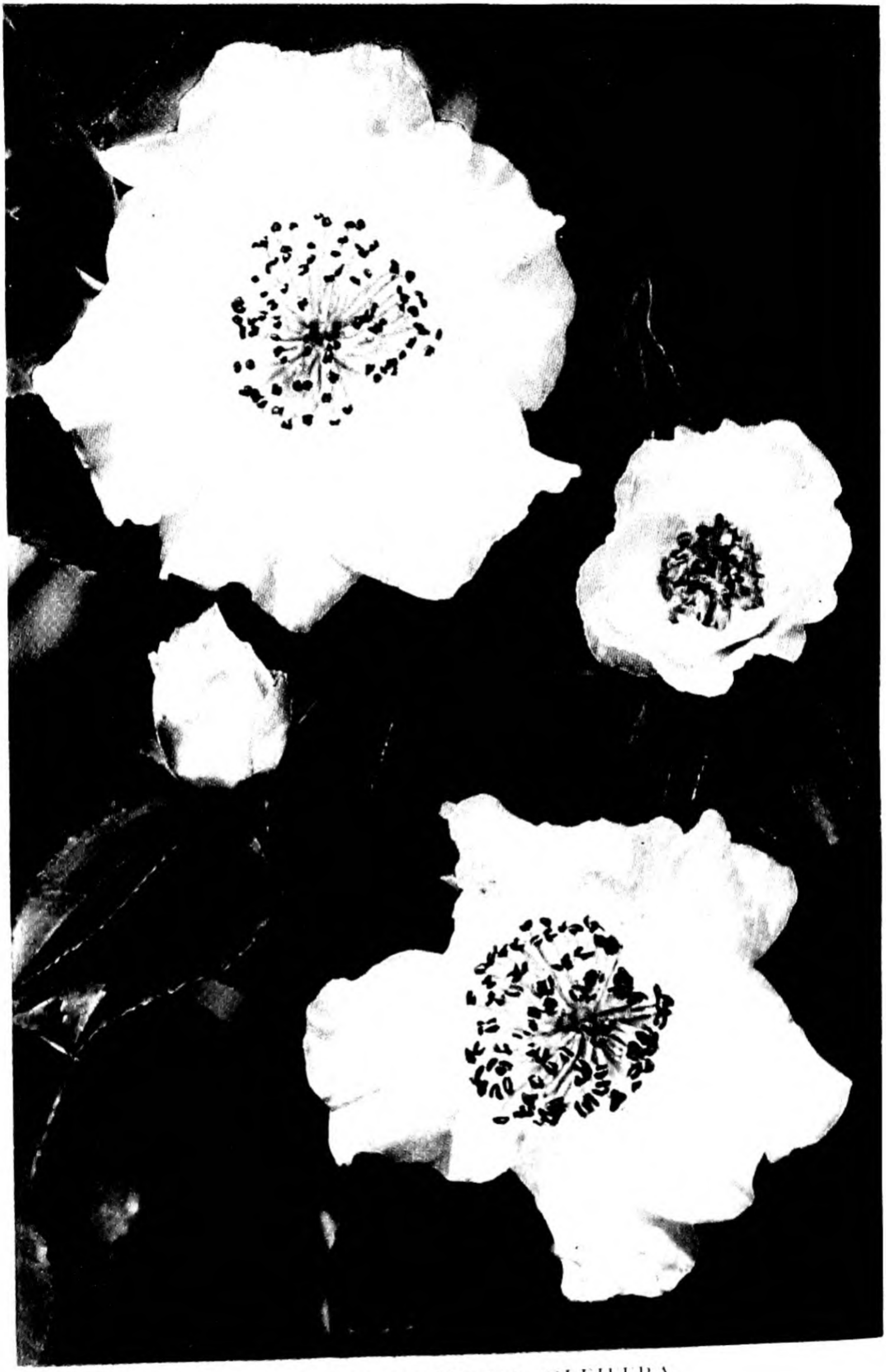
Tea scale

by spraying with Florida Volck or similar oil emulsion spray in spring as soon as the new growth is sufficiently matured to stand it, and again in late September or early October if necessary. Usual strengths of this spray are one to 100 or one to fifty or sixty. It is best to follow instructions on the container.

In warmer parts of the camellia cultural areas, the Florida red scale, *Chrysomphalus aonidum*, is sometimes a pernicious pest and at all times difficult to control. Leaves are attacked on both surfaces. The mature female scale is circular in outline, 1.5 mm. in diameter or a little more, dark reddish brown in color with a small elevated point in the center. Mature insects beneath the scale covering are top shaped and bright yellow in color. The scale is thick, heavy and closely pressed against the leaf surface, affording good protection. Male scales are the same shape but only about one-quarter the size of the females. At first, that is just after hatching, crawlers are oval in outline. For about two days they crawl about, then settle down, and by the third day they are circular. With the laying of eggs when the females are ten weeks old or so, their life cycle is completed. This scale is capable of doing serious damage to camellias; a heavy infestation results in defoliation, death of twigs and even plants. Control measures are the same as those given for tea scale. Because of their thick, closely adhering scales, thorough spraying is necessary. Range of the Florida red scale northward under indoor conditions evidently is limited by low temperatures in winter.

Florida red scale

Although at this time not widely spread or abundant, the peony scale, *Pseudaonidia pæoniæ*, is capable of doing serious damage to camellias. It appears to be increasing. It is also an azalea pest. Severe infestations result in the death of twigs, branches and even



CAMILLIA SASANQUA. OLEIFERA

trunks. These are the parts attacked; it is not a leaf-infesting scale. When the adult scales die and drop off, they leave round, light-colored (almost white) marks 2 or 3 mm. in diameter on the bark, corresponding to the sizes of the scales. These marks may be separated or they may touch one another in lines or patches. When numerous, they give the bark a grayish white color. Scales covering the females of this insect are about 3 mm. in diameter and quite elevated. The male scales are somewhat smaller. They resemble the surrounding bark so closely as to be scarcely distinguishable from it, and their presence may not be detected until they begin to drop off. Since these scales attack bark-covered parts of the host, it appears that they must penetrate the bark so that the cambium, from which juice is sucked, can be reached. The insects beneath the scales are purple. Eggs deposited beneath the scale covering hatch in April and May in southern areas. The crawlers move to adjacent twigs or branches, where they locate and develop the scale covering. At this stage they appear as tiny white specks on the bark. By autumn they reach maturity. There is only one brood a year. Since they are well protected by their scale coverings, they are not easily destroyed. The best time to spray is when the crawlers are moving about and those that have settled down are still immature. A white oil emulsion, Florida Volck, applied early in June or late in May will give control. Small branches that are severely infested should be pruned away and burnt. Spraying should be done thoroughly. Trunks or larger branches can be scrubbed to advantage with a small brush dipped in the spray material.

Peony scale

Although the camellia scale, *Lepidosaphes camelliæ*, is not so serious a pest as the tea scale, it sometimes increases in number sufficiently to do a considerable

Camellia scale

amount of damage to foliage. It infests leaves only. Cuttings and small plants may be defoliated, stunted and severely injured. The female scale is about 2 mm. in length, light to dark brown in color, broader and rounded at one end, tapered to a point at the other, and resembles a tiny oyster shell. The male scale is somewhat narrower and shorter. Eggs to the number of twenty-five to fifty are produced by each female. From these the crawlers emerge and find their way to the surfaces of leaves both young and old. There they settle down and develop protective scale coverings. In nine to ten weeks they are matured. In summer different broods overlap so that scales in different stages of development are present at all times on the host plants. During the winter reproduction is slowed down or stopped completely. The camellia scale can be effectively controlled by using the same spray that is recommended for others.

Chaff scale

Parlatoria camelliæ, one of the chaff scales, is an important camellia pest, particularly on the Pacific Coast. To a less extent it occurs and is troublesome elsewhere. It is found on both leaves and branches. The female scale covering is thin, flat, elongate oval, dark brown in color, about 1.5 mm. long and slightly broader at one end than at the other. Beneath the scale the female is purple. Male scale coverings are oblong and dull white in color. About sixteen eggs are laid, and when the crawlers are hatched they move about for a few hours before settling down in a shady place and becoming fixed. Between March and October there are several overlapping generations. Fortunately this pest is readily controlled by spraying with Florida Volck.

Attention to details necessary

There are several things that must be given careful attention in spraying camellias. It is, of course, necessary to destroy the insects against which the spray is

directed, but it is equally important to do this without injury to the foliage or other parts of the plants. To this end the spray material must be mixed according to formula, and as a safe general rule it is best not to use a spray of any kind that has been made up and left standing for several hours or overnight.

A white oil spray may be used at the rate of one to 100 for the late April or early May application, but for the application in the fall a strength of one to fifty or one to sixty can be used. Spraying should be done thoroughly and systematically, to the end that the coverage is complete and that no parts of the plant are missed. The spray should be directed against the undersides of the leaves particularly, but the uppersides should be covered as well. A fine misty spray should be used. It is not good spray practice to drench the plants. In advance of spraying, it is advisable to prune out all dead twigs and those that are carrying only a few leaves. These are likely to be infested, since many scales seek the shaded parts of the tree. The removal of the branches not only takes away a number of insects, but it makes possible a better job of spraying. Oil sprays should not be used at high temperatures, nor should they be given in cold or frosty weather because of the danger of injuring foliage and even defoliating plants. The best temperature is about 70 or 75°.

Applying sprays

A good time to apply dust is in the evening; in advance of application the plants may be syringed lightly to help the dust adhere to the leaves and branches. Finally, it must be emphasized again that the insects against which oil is used must be hit if they are to be controlled or destroyed.

Dr. Kuitert, working on the control of camellia insects and mites, has secured good control of the

black citrus aphid, red mite, camellia scale, tea scale and Florida red scale with parathion used at the rate of three pounds of 15 percent wettable powder to 100 gallons of water (one ounce to two gallons of water). For mite control, a second spraying should be given about twelve days after the first to take care of those mites that hatch from eggs in the interval. Parathion can be used on camellia plants in warm weather without danger of injuring them or tender immature foliage. It can also be used in winter but is not so effective in controlling insects. The parathion powder should be mixed thoroughly with a small quantity of water before mixing it with the total amount of water needed. Insecticide powders containing parathion are handled in the trade under a number of different names.

Parathion

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